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Yoshida et al.

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(45) **Date of Patent: May 31, 2016**

(54) **DEVELOPER ACCOMMODATING CONTAINER, PROCESS CARTRIDGE AND ELECTROPHOTOGRAPHIC IMAGE FORMING APPARATUS**

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G03G 21/16 (2006.01)

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CPC ***G03G 15/0882*** (2013.01); ***G03G 15/0841*** (2013.01); ***G03G 15/0868*** (2013.01); ***G03G 15/0874*** (2013.01); ***G03G 15/0898*** (2013.01); ***G03G 21/1676*** (2013.01); *G03G 2215/0682* (2013.01); *G03G 2215/0687* (2013.01); *G03G 2215/0875* (2013.01)

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CPC G03G 15/0868; G03G 15/0841; G03G 15/0874; G03G 2215/0682; G03G 2215/0687; G03G 2215/0875; G03G 15/0898; G03G 15/0882; G03G 21/1676
USPC 399/103, 106, 119, 120, 258
See application file for complete search history.

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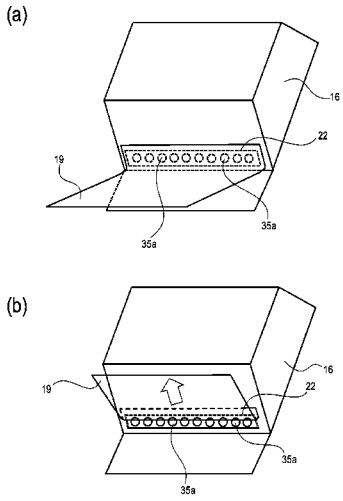
(74) *Attorney, Agent, or Firm* — Fitzpatrick, Cella, Harper & Scinto

(57) **ABSTRACT**

A developer accommodating container for accommodating a developer includes: a flexible container provided with an opening for permitting discharge of the developer; a sealing member for sealing the opening in a state in which the sealing member is bonded to a periphery of the opening, wherein the sealing member is capable of exposing the opening by being removed by pulling; and a reinforcing portion, provided at least as a part of the periphery of the opening, for decreasing a degree of deformation of the opening.

28 Claims, 18 Drawing Sheets



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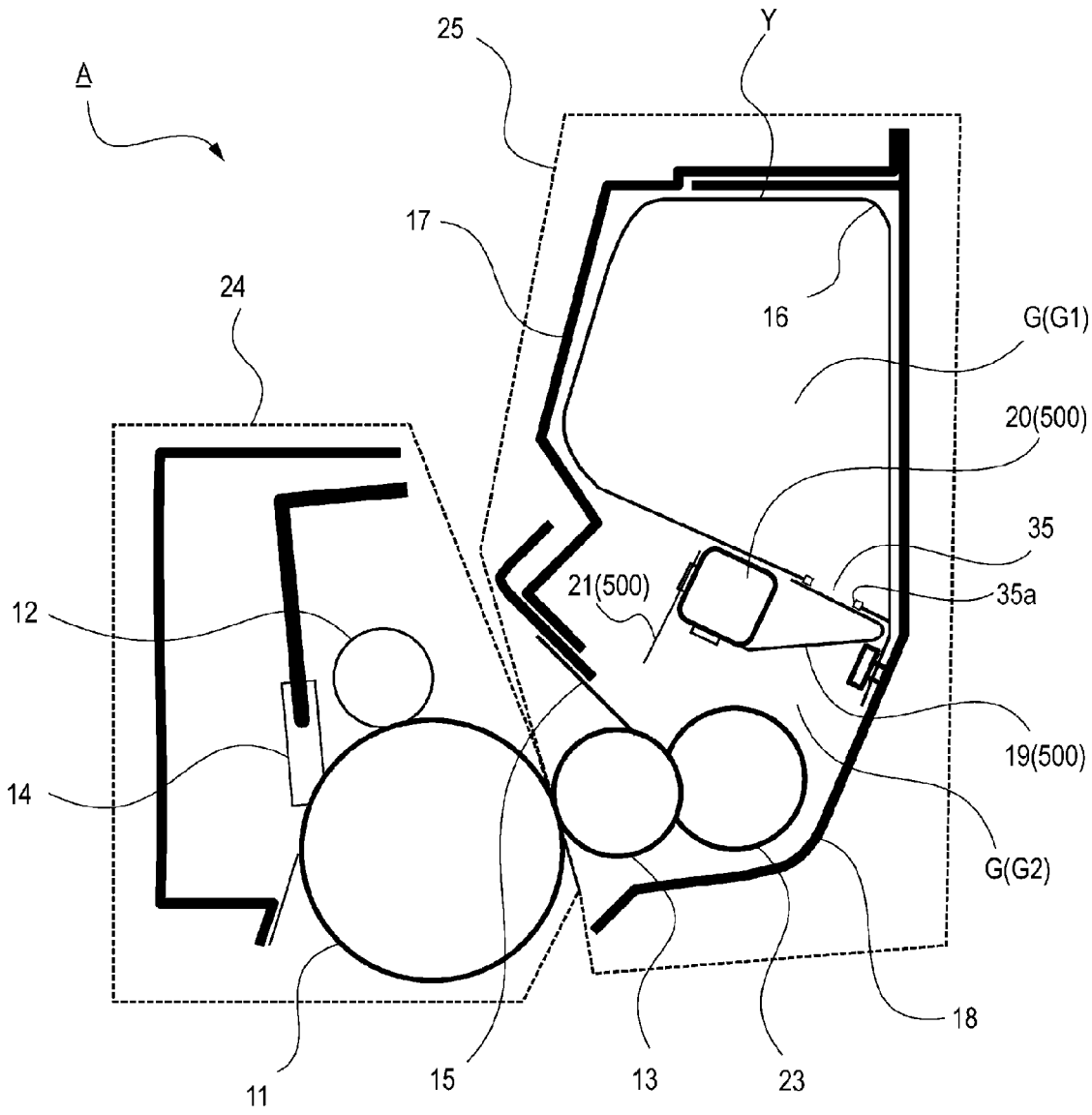

A
25
Y
17
16
24
G(G1)
20(500)
35
21(500)
35a
12
19(500)
14
G(G2)
18
11
15
13
23

Fig. 1

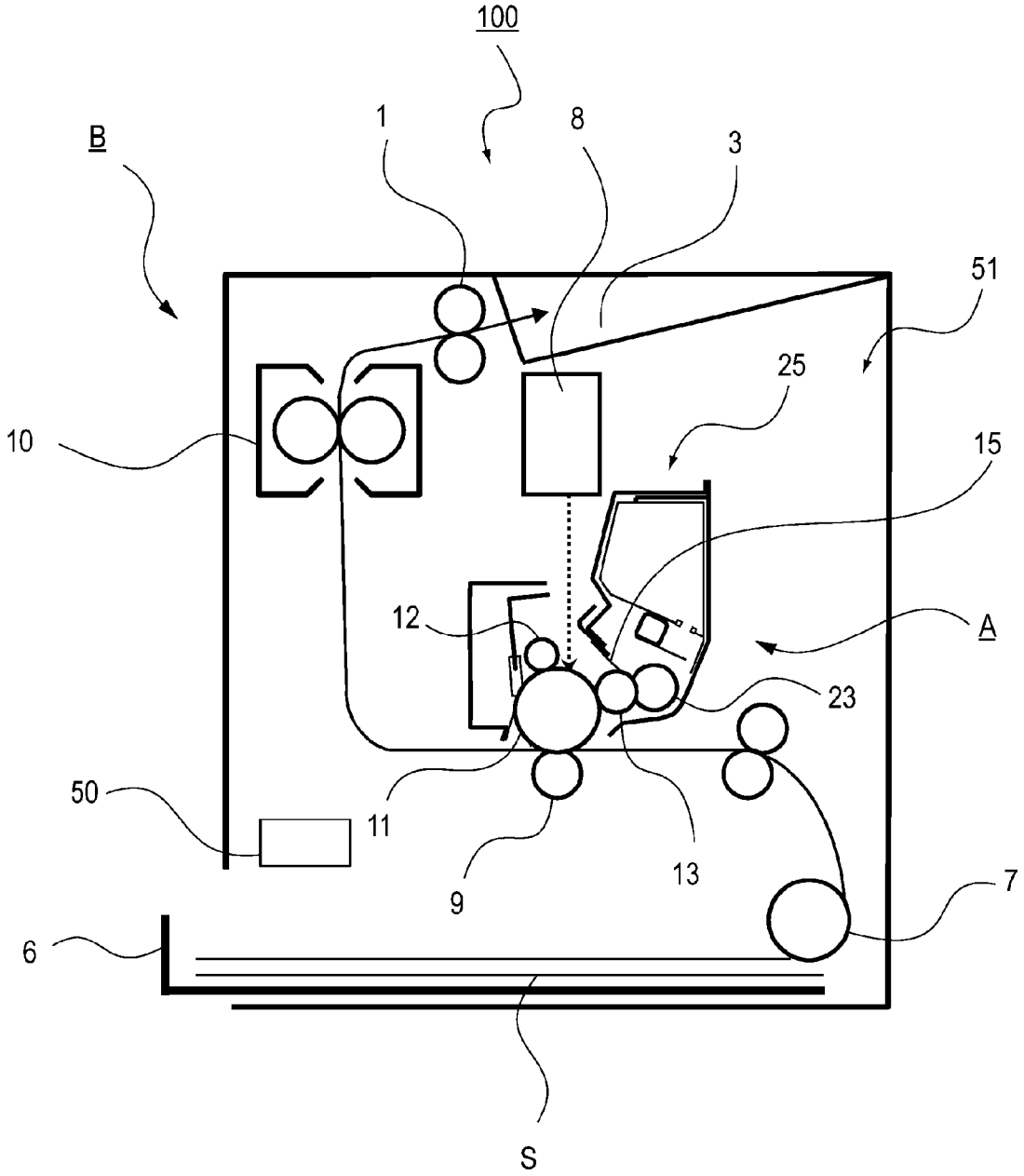
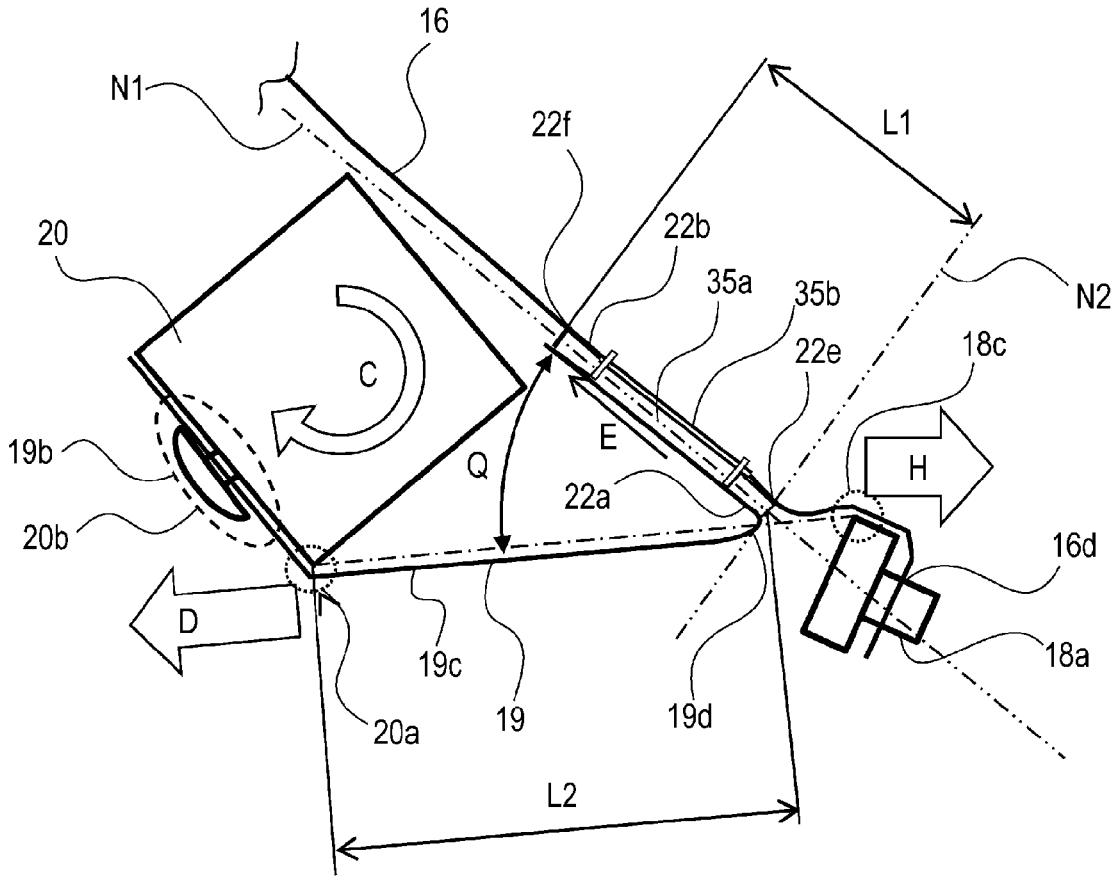


Fig. 2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N1
22f
L1
20
22b
35a
35b
N2
C
22e
18c
19b
E
H
Q
22a
20b
16d
D
18a
19c
19
19d
20a
L2

Fig. 3

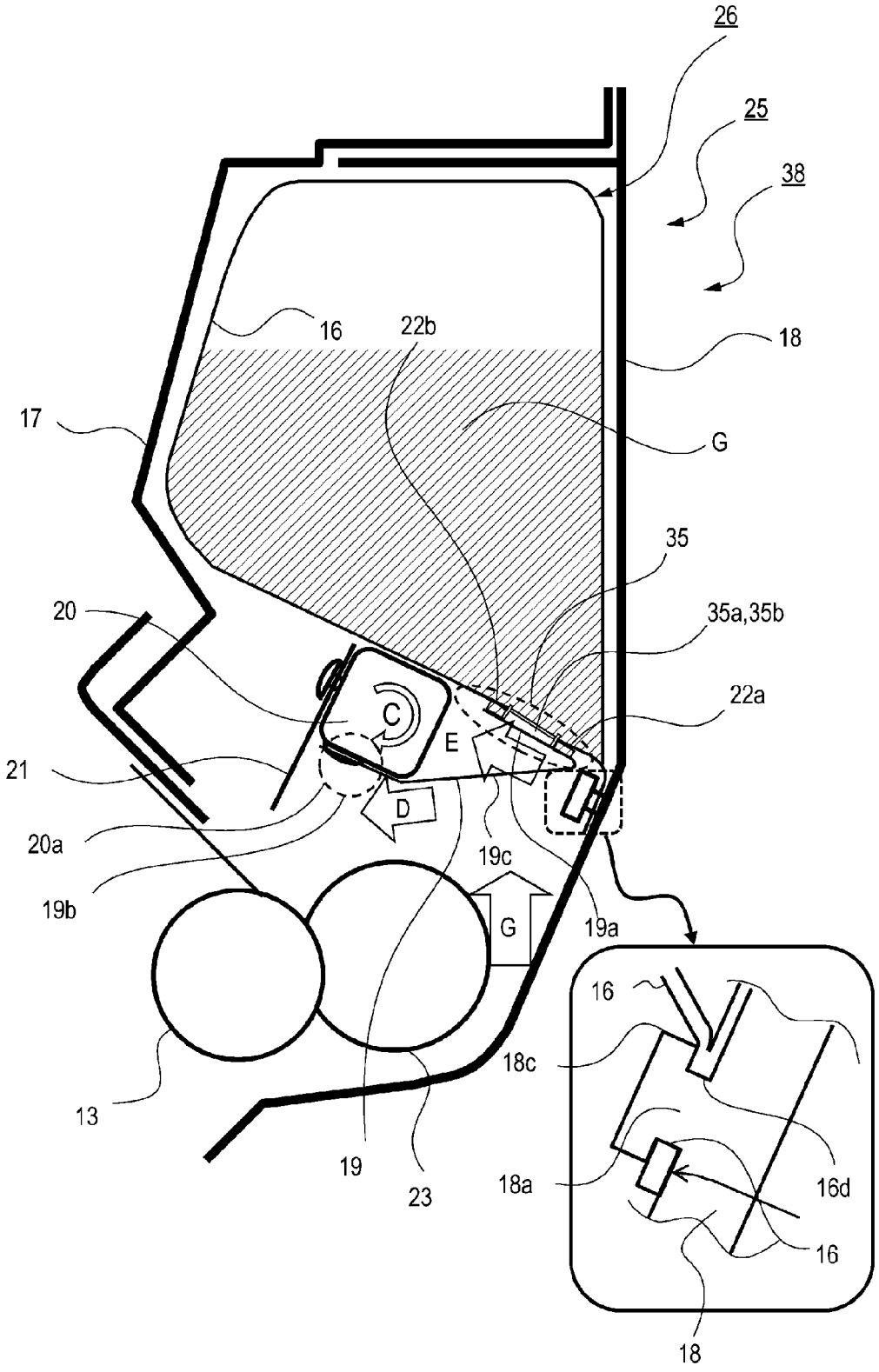
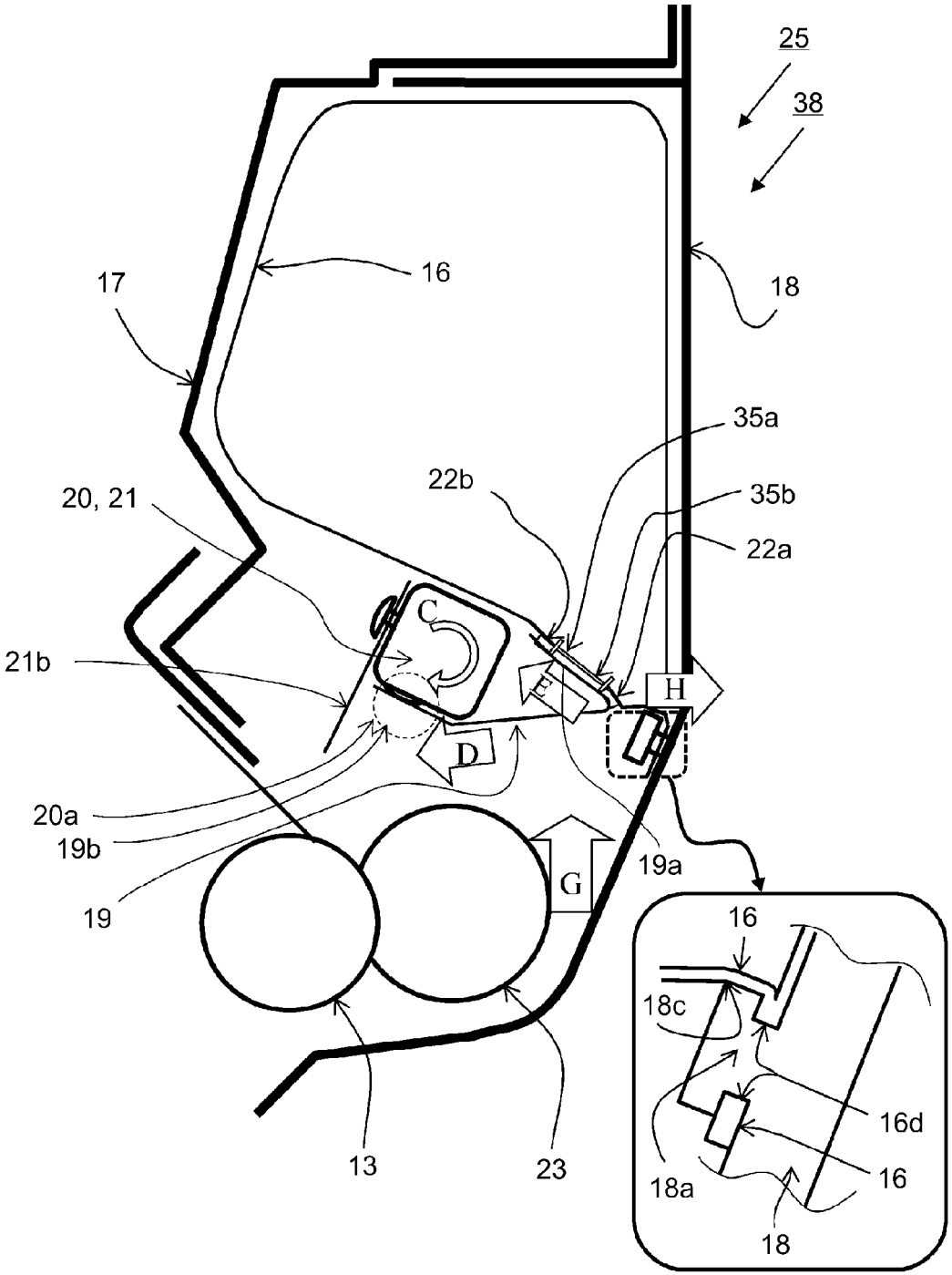

26
25
38
16
22b
18
17
G
35
20
35a,35b
22a
C
E
21
D
20a
19c
19b
G
19a
16
18c
13
19
23
18a
16d
16
18

Fig. 4


25
38
16
17
18
35a
22b
35b
20, 21
22a
C
21b
E
H
D
20a
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19a
G
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18c
16d
16
18a
18
13
23

Fig. 5

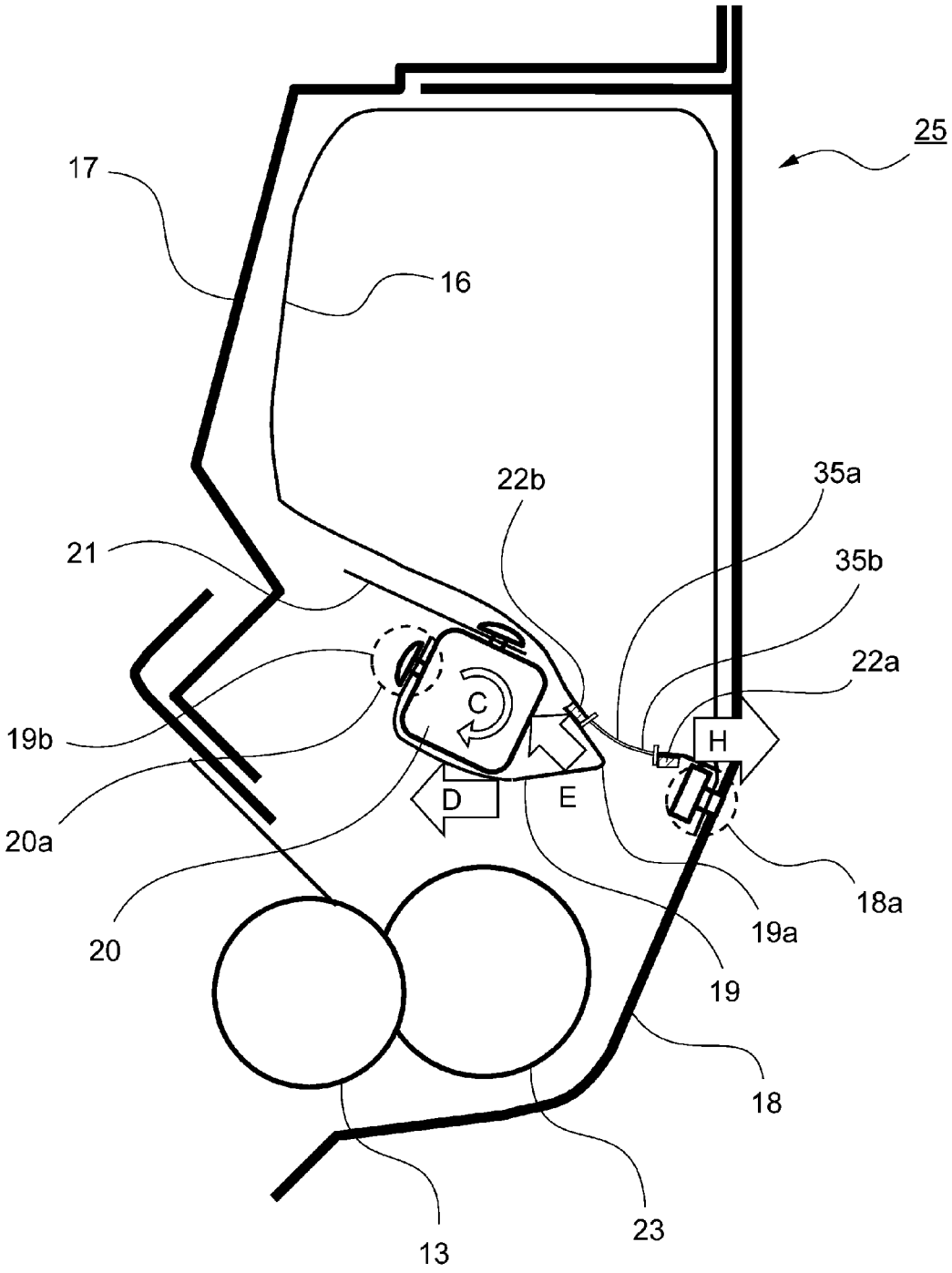


Fig. 6

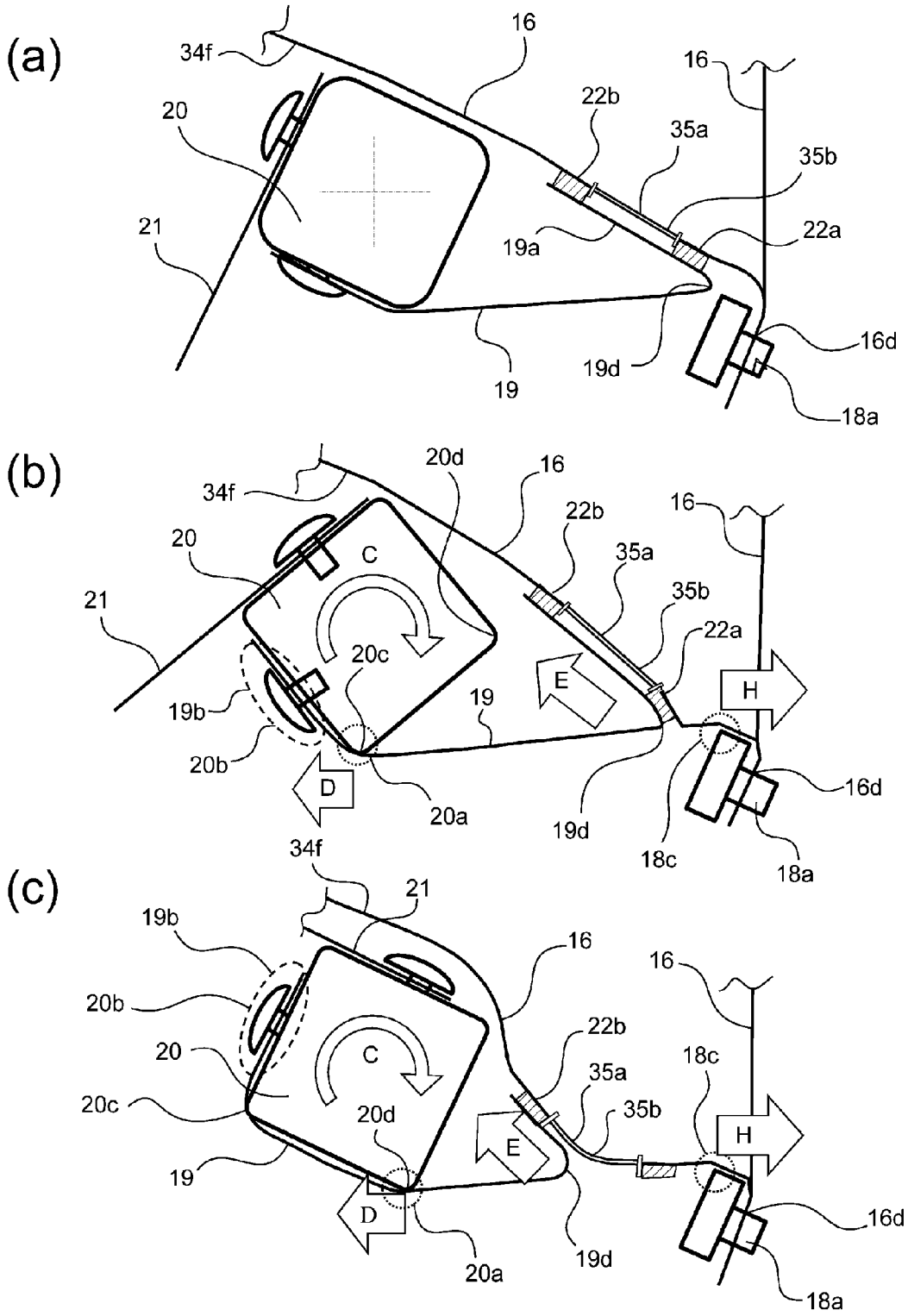
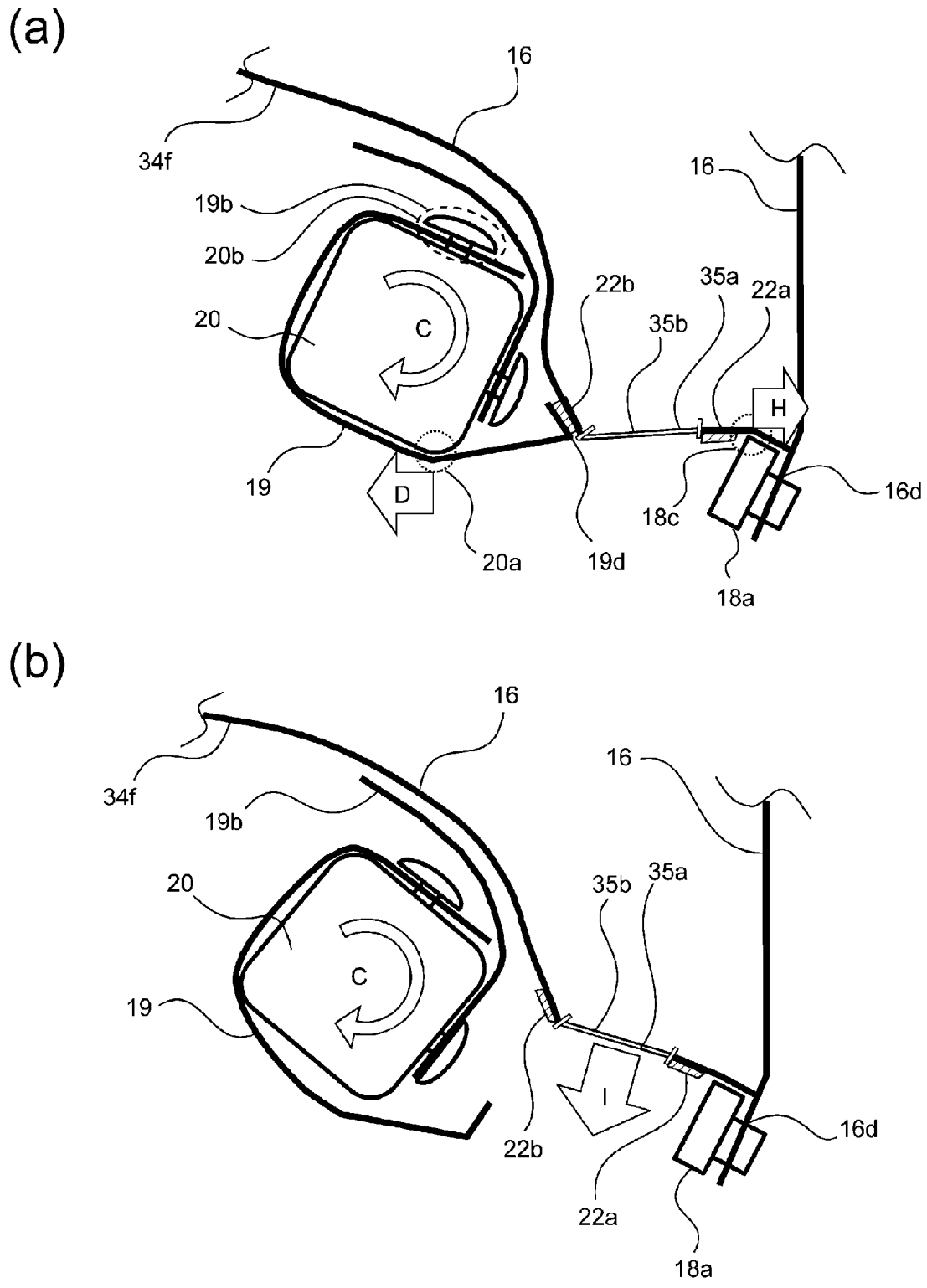

(a)
34f
16
16
22b
20
35a
35b
21
19a
22a
19
19d
16d
18a
(b)
20d
16
34f
22b
16
20
C
35a
35b
21
22a
20c
E
H
19b
19
20b
D
20a
19d
16d
18c
18a
(c)
34f
21
19b
16
16
20b
22b
20
C
18c
35a
20c
20d
35b
E
H
19
D
16d
20a
19d
18a

Fig. 7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20b
20
C
22b
35a
22a
35b
16
H
19
D
18c
16d
20a
19d
18a
(b)
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34f
19b
16
20
35b
35a
C
19
I
22b
16d
22a
18a

Fig. 8

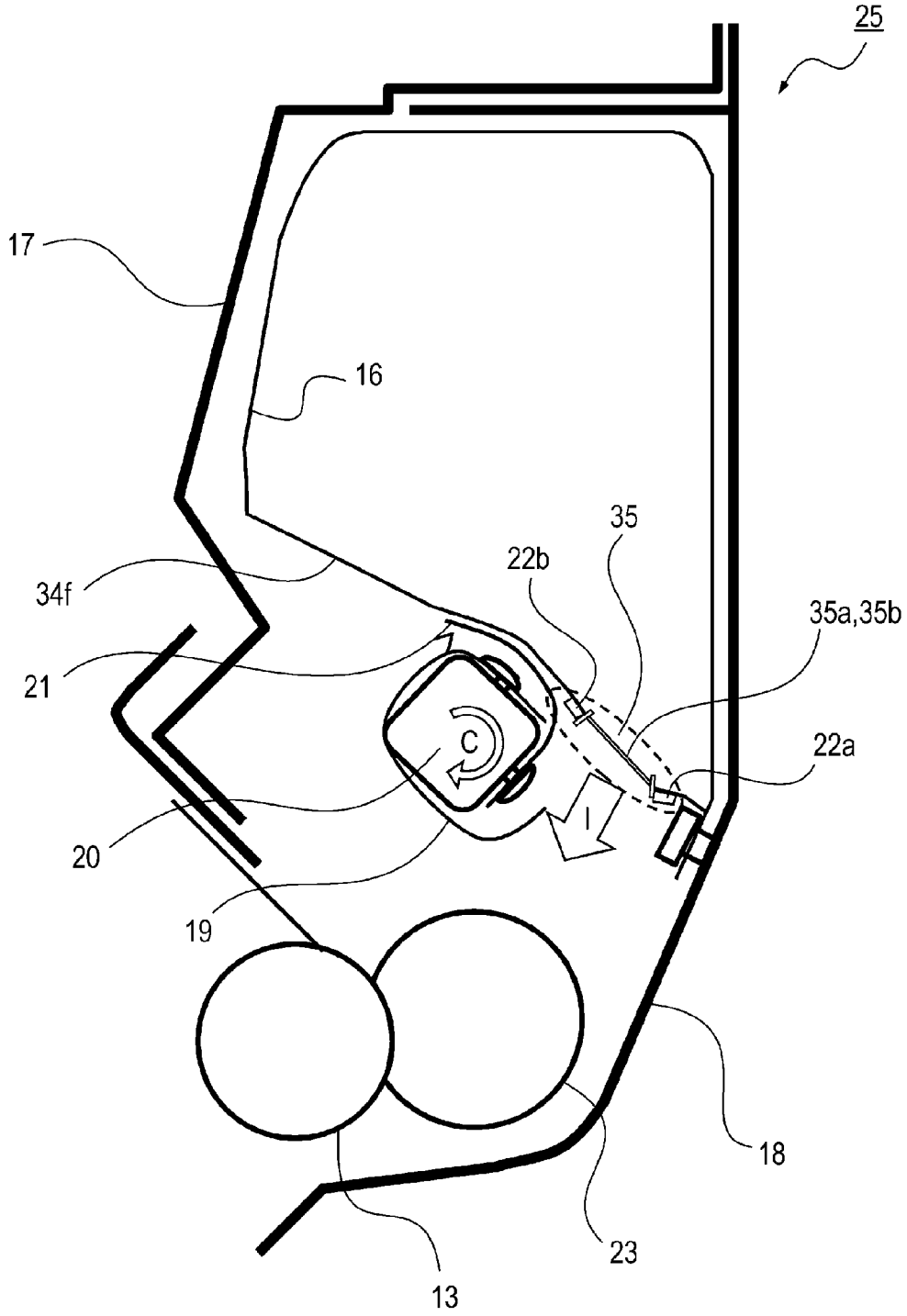


Fig. 9

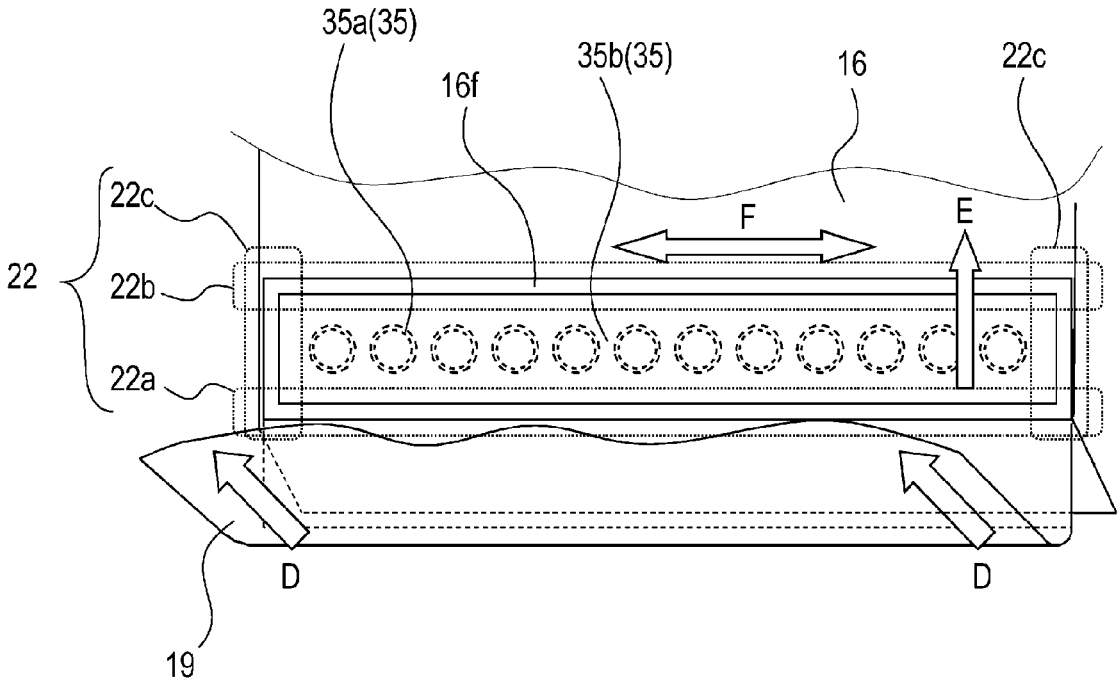
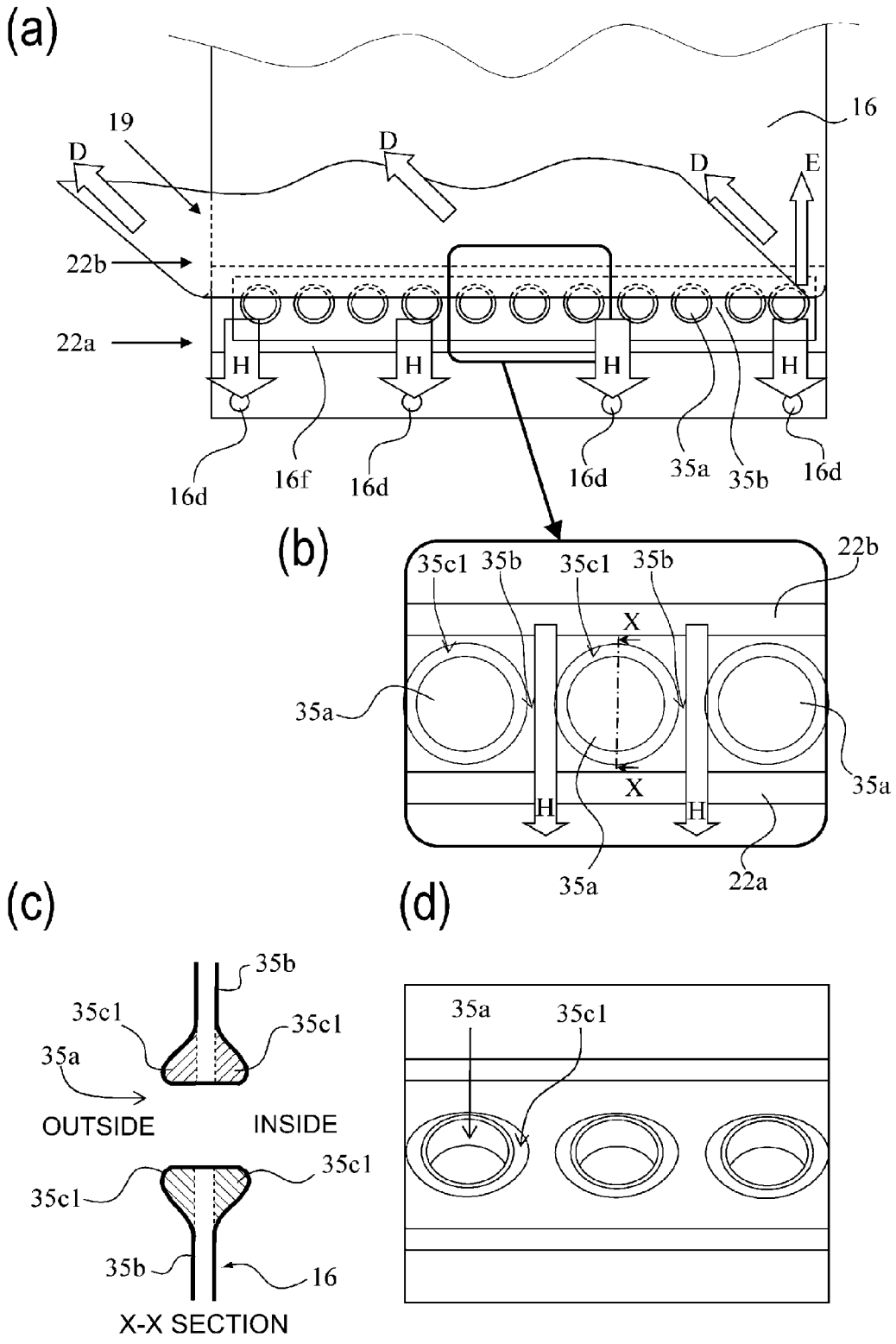


Fig. 10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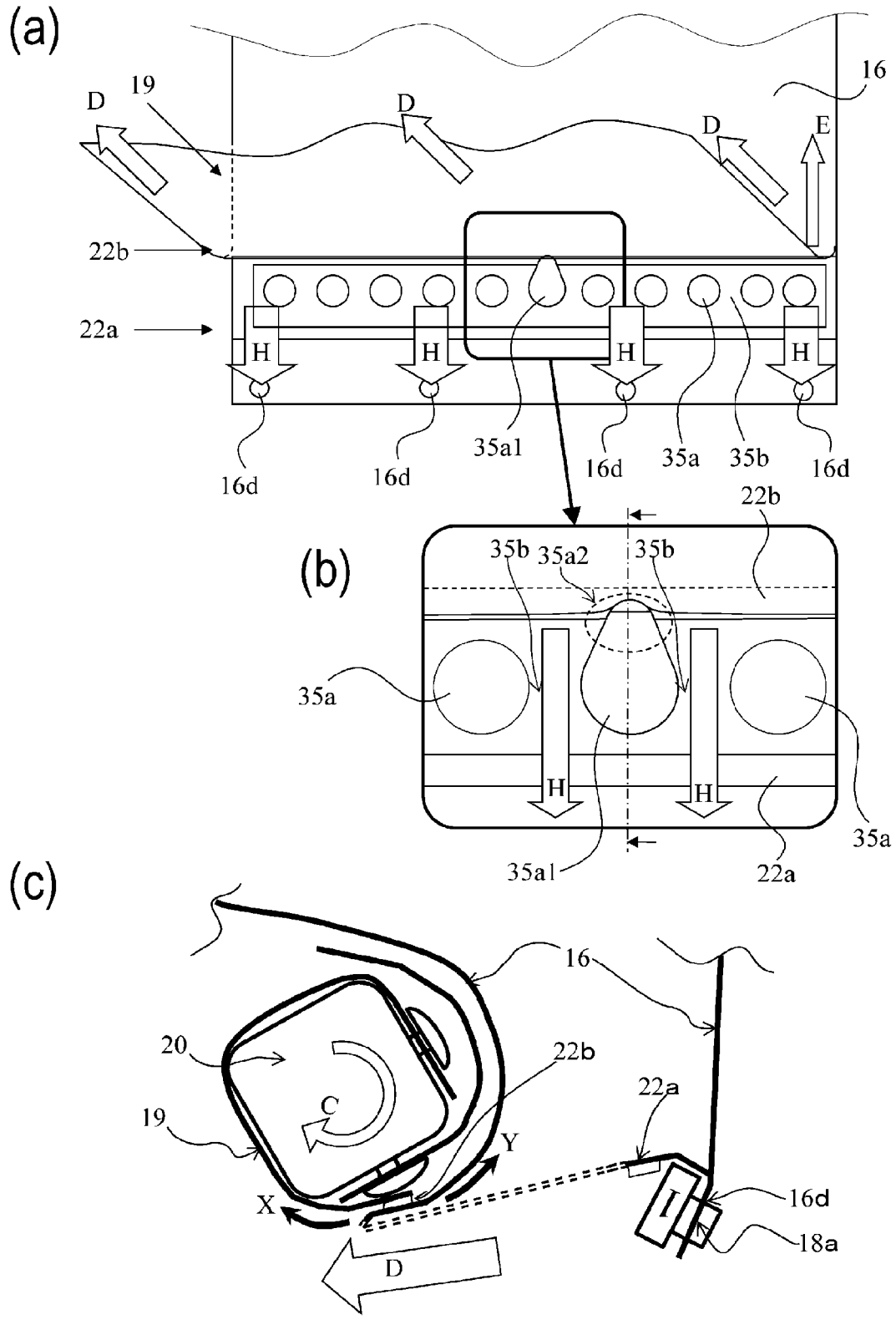
19
D
D
D
E
16
22b
22a
H
H
H
H
16d
16f
16d
16d
35a
35b
16d
(b)
35c1
35b
35c1
35b
22b
X
35a
35a
X
H
H
35a
22a
(c)
(d)
35b
35c1
35c1
35a
OUTSIDE
INSIDE
35c1
35c1
35b
16
X-X SECTION
35a
35c1

Fig. 11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D
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D
D
E
16
22b
22a
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H
H
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16d
16d
35a1
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35a
35b
16d
(b)
22b
35b
35a2
35b
35a
H
H
35a
35a1
22a
(c)
16
20
22b
22a
C
19
Y
X
16d
18a
D

Fig. 12

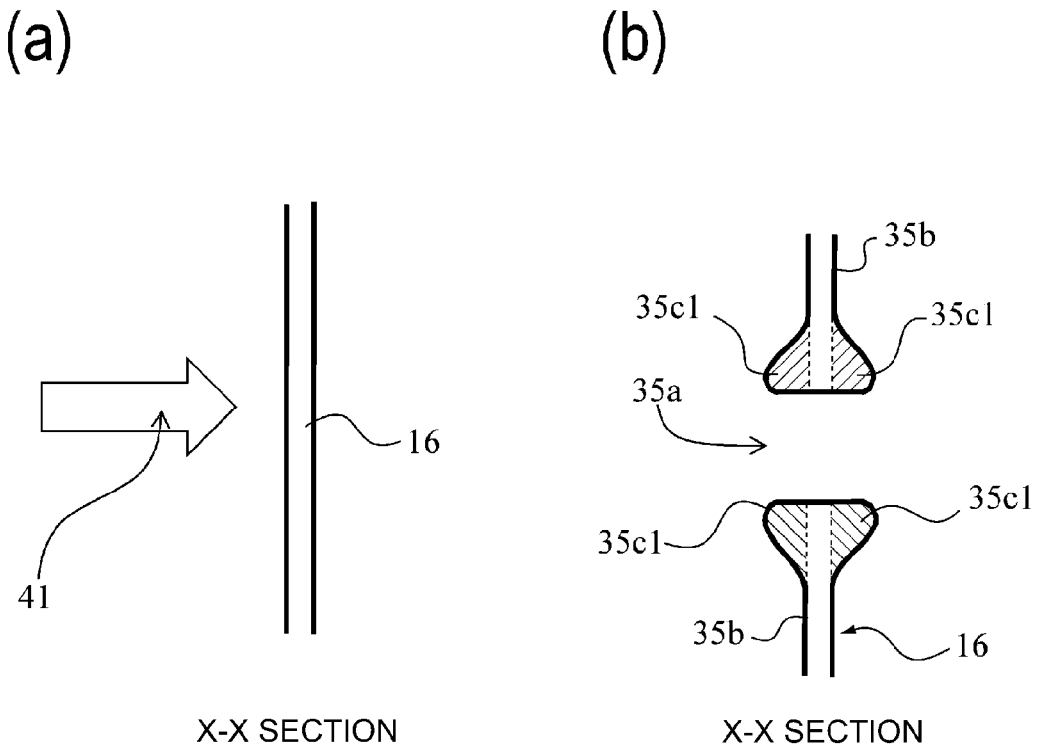

(a)
(b)
16
41
X-X SECTION
35b
35c1
35c1
35a
35c1
35c1
35b
16
X-X SECTION

Fig. 13

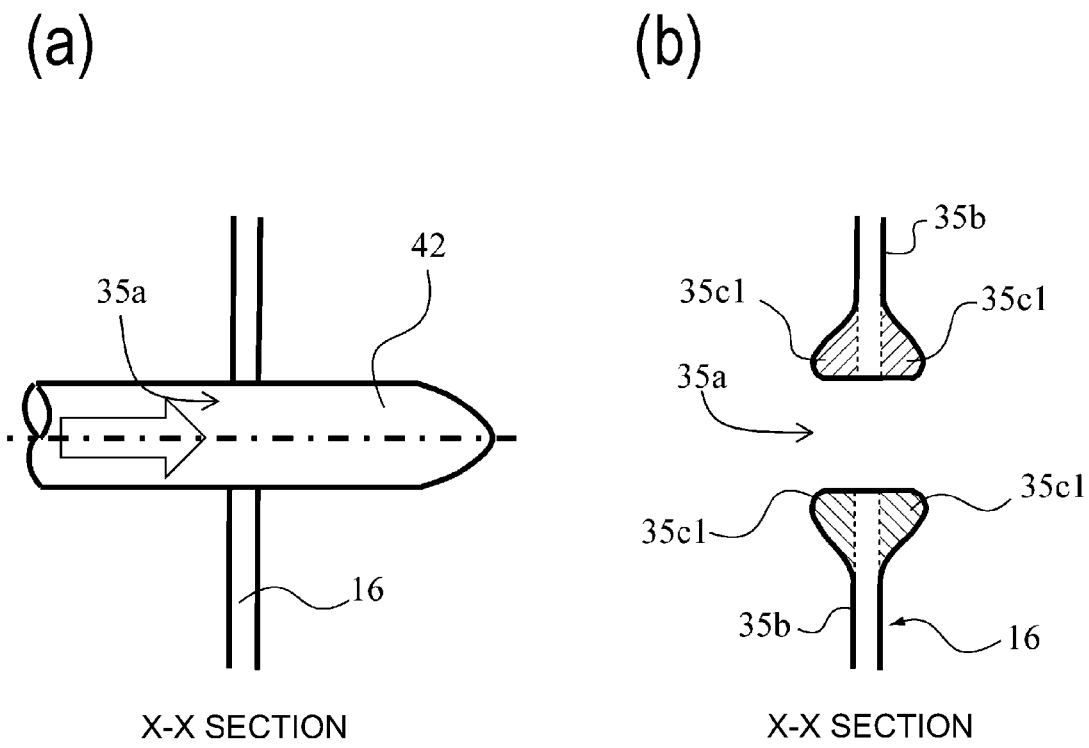
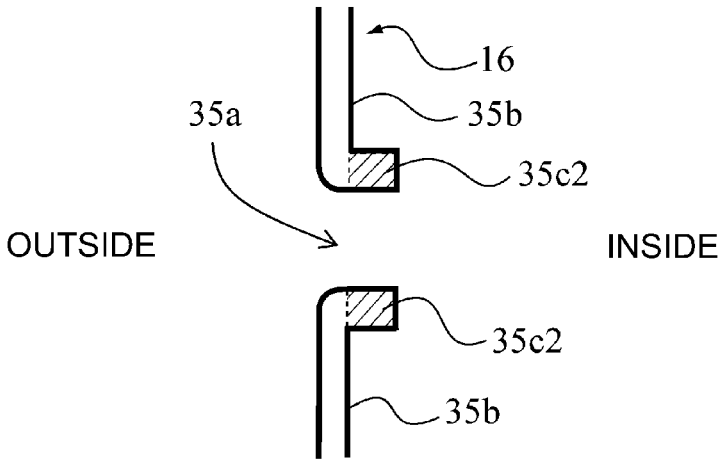

(a)
(b)
35a
42
16
X-X SECTION
35b
35c1
35c1
35a
35c1
35c1
35b
16
X-X SECTION

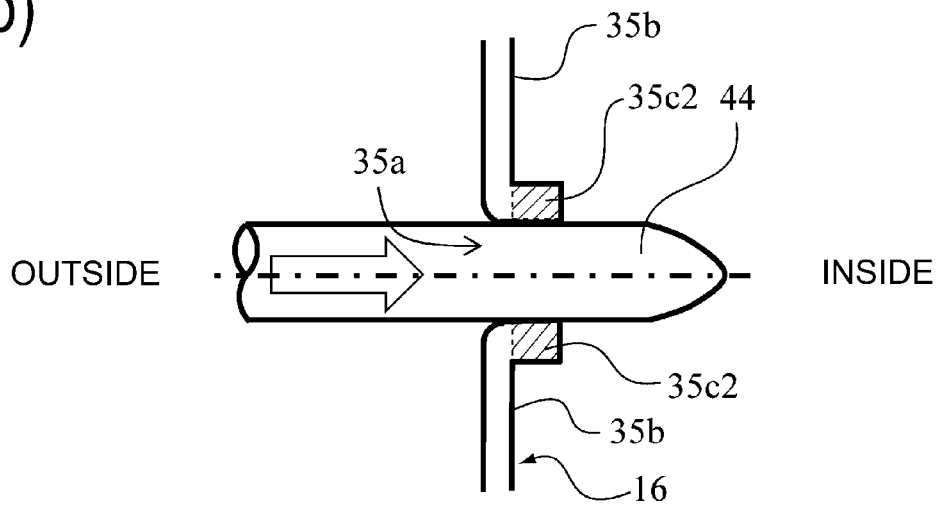
Fig. 14

(a)



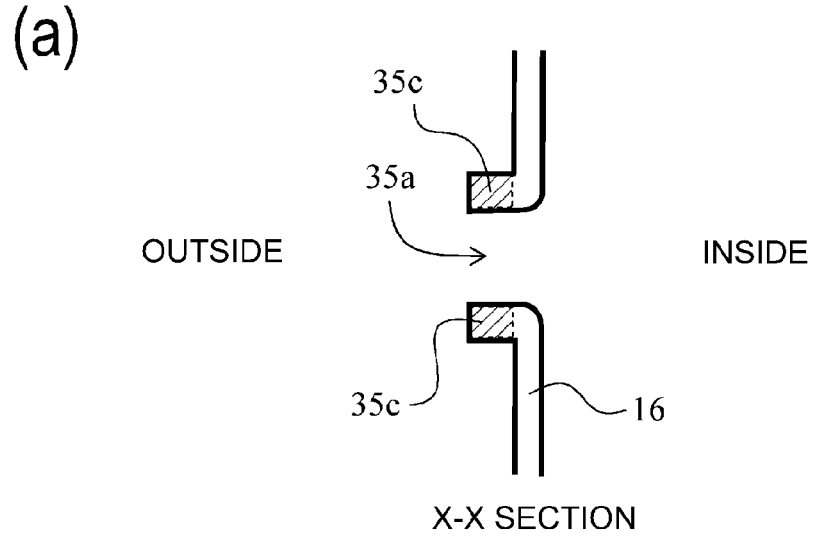
X-X SECTION

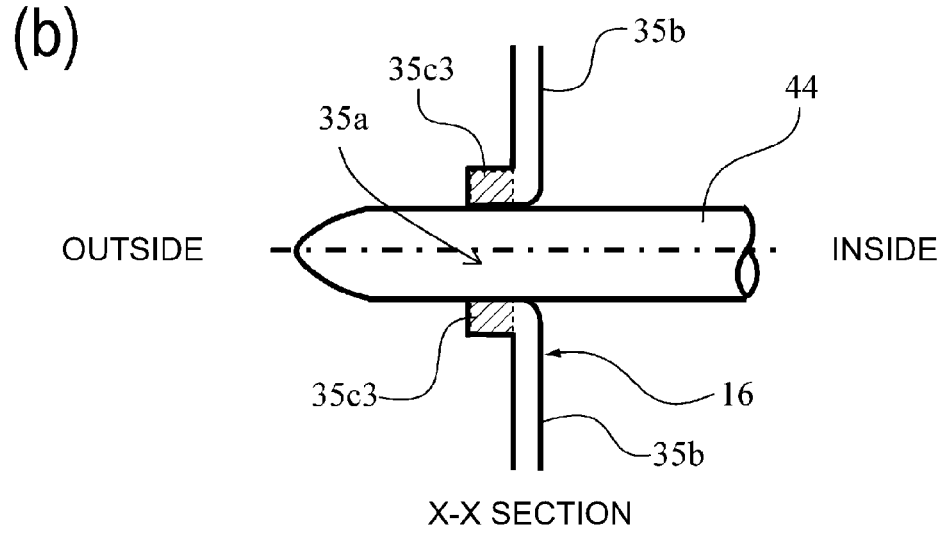
(b)



X-X SECTION

Fig. 15


(a)
35c
35a
OUTSIDE
INSIDE
35c
16
X-X SECTION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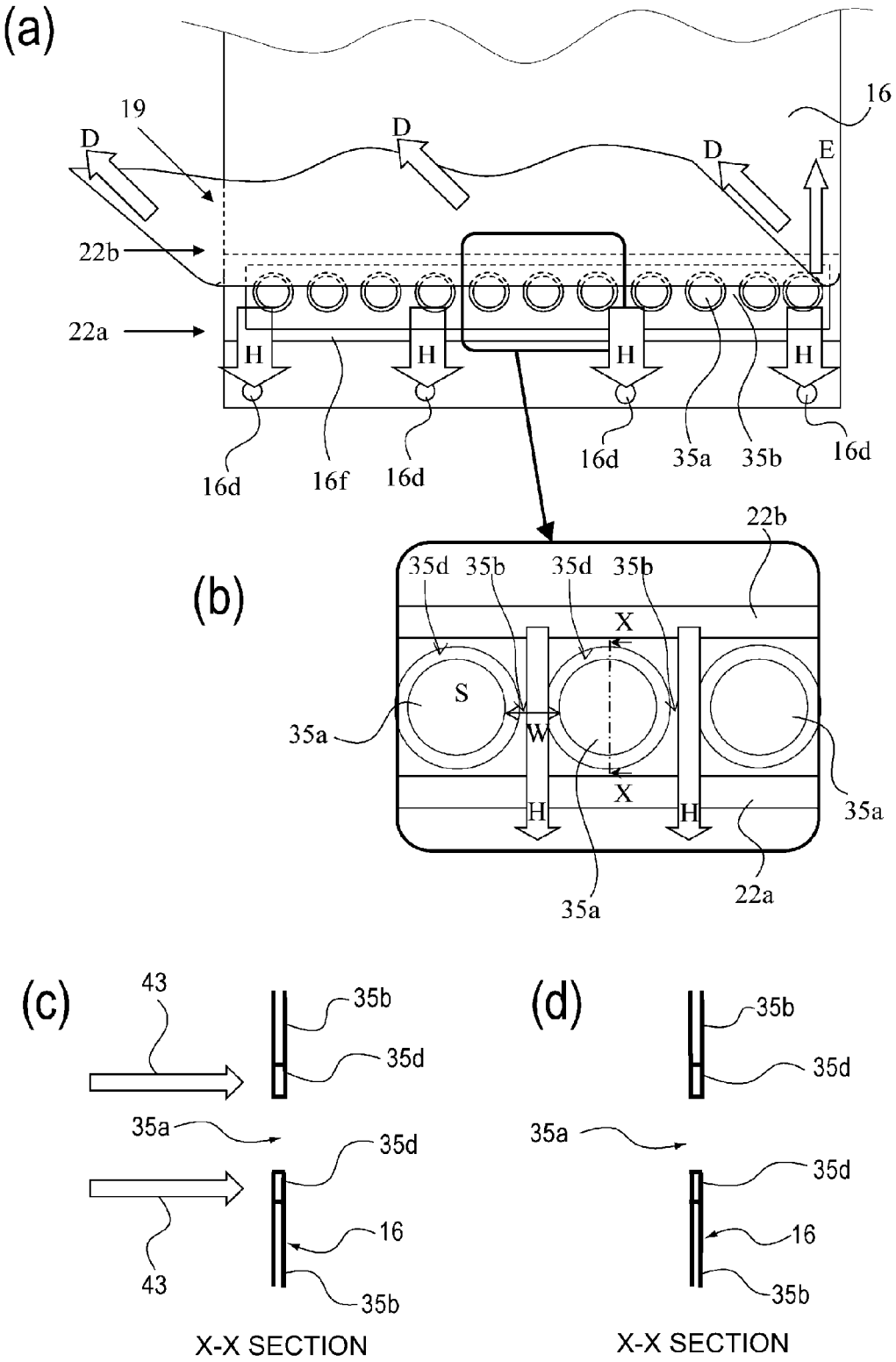
35c3
44
35a
OUTSIDE
INSIDE
35c3
16
35b
X-X SECTION

Fig. 16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D
D
D
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22b
22a
H
H
H
H
16d
16f
16d
16d
35a
35b
16d
(b)
22b
35d
35b
35d
35b
X
S
W
35a
X
H
H
35a
35a
22a
(c)
43
35b
35d
35a
35d
16
43
35b
X-X SECTION
(d)
35b
35d
35a
35d
16
35b
X-X SECTION

Fig. 17

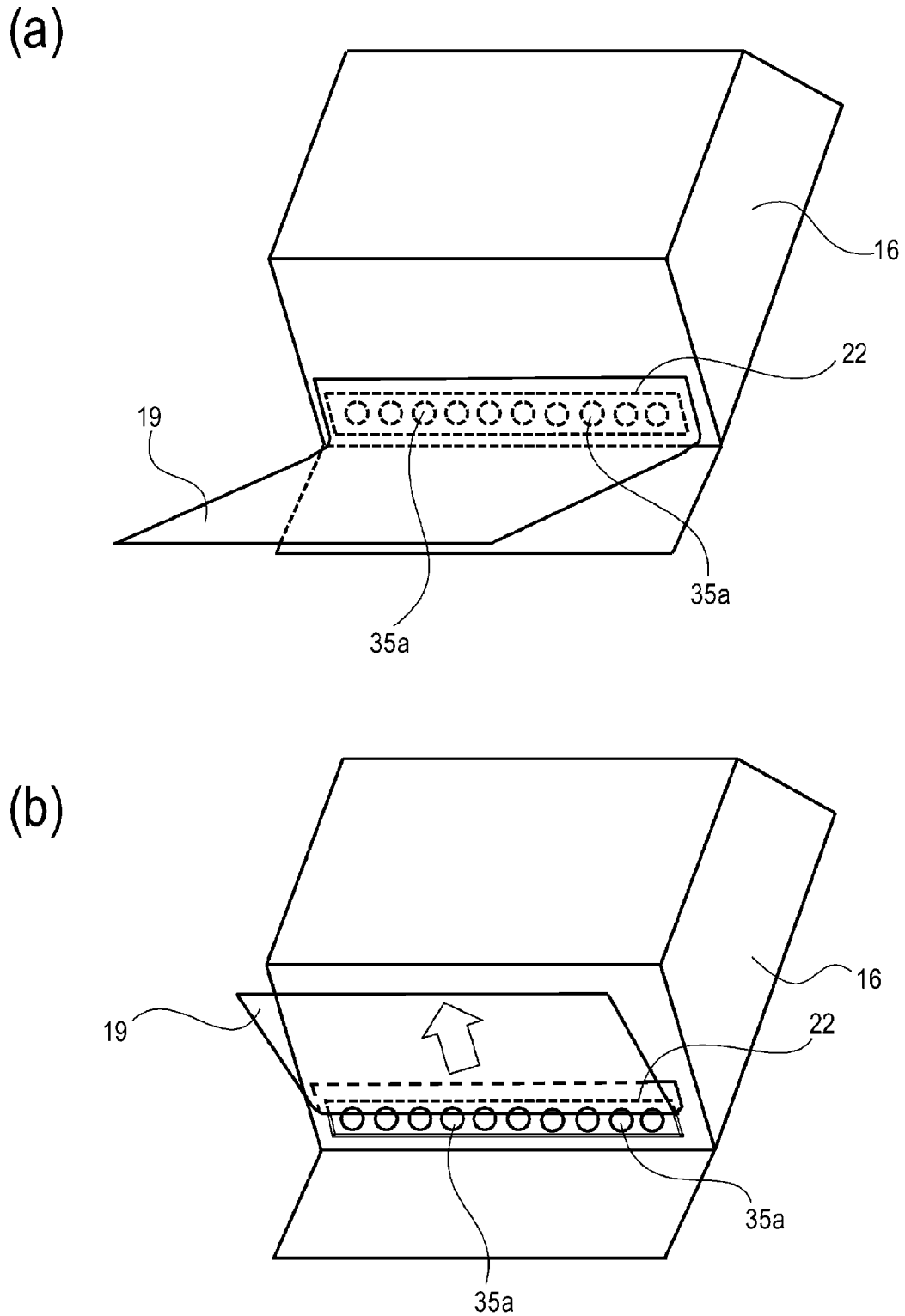

Fig. 18

DEVELOPER ACCOMMODATING CONTAINER, PROCESS CARTRIDGE AND ELECTROPHOTOGRAPHIC IMAGE FORMING APPARATUS

FIELD OF THE INVENTION AND RELATED ART

The present invention relates to a developer accommodating container for accommodating a developer, and a process cartridge, and an electrophotographic image forming apparatus which include the developer accommodating container.

The image forming apparatus forms an image on a recording material (medium) by using, e.g., an electrophotographic image forming process and may include, e.g., an electrophotographic copying machine, an electrophotographic printer (such as an LED printer or a laser beam printer), an electrophotographic facsimile machine, and the like.

Further, the process cartridge refers to a cartridge, prepared by integrally assembling at least a developing means and a developing device, detachably mountable to a main assembly of the image forming apparatus and refers to a cartridge, prepared by integrally assembling the developing device and a photosensitive member unit including at least a photosensitive member, detachably mountable to the main assembly of the image forming apparatus.

Further, a developer accommodating container and the developer accommodating unit are accommodated in the image forming apparatus or the process cartridge. The developer accommodating unit container and the developer accommodating unit at least include a flexible container for accommodating the developer.

In a conventional electrophotographic image forming apparatus using the electrophotographic image forming process, a process cartridge type in which an electrophotographic photosensitive member and process means acting on the photosensitive member are integrally assembled into a cartridge and this cartridge is detachably mountable to a main assembly of the electrophotographic image forming apparatus is employed.

Further, for the purpose of preventing a phenomenon such that the developer is scattered into the main assembly in a developer filling step during manufacturing of the process cartridge, a constitution in which a deformable inside container is used has been devised (Japanese Laid-Open Patent Application (JP-A) Hei 04-66980). In this constitution, an object is to improve operativity of supply of the developer and to reducing a cost of a developer supplying device by preventing the scattering of the developer from the process cartridge into the main assembly of the image forming apparatus.

However, in the case where the developer is accommodated in such a deformable developer accommodating container, when the toner seal is unsealed, an opening of a developer accommodating member is pulled by the toner seal to be largely deformed and thus it becomes difficult to unseal the thickness seal (expose the opening) in some cases.

SUMMARY OF THE INVENTION

A principal object of the present invention is to provide a developer accommodating container capable of decreasing a degree of deformation of an opening to reduce a load necessary to peel a sealing member when the sheet is peeled from a flexible container at a periphery of the opening.

According to an aspect of the present invention, there is provided a developer accommodating container for accommodating a developer, comprising: a flexible container provided with an opening for permitting discharge of the developer; a sealing member for sealing the opening in a state in which the sealing member is bonded to a periphery of the opening, wherein the sealing member is capable of exposing the opening by being removed by pulling; and a reinforcing portion, provided at least as a part of the periphery of the opening, for decreasing a degree of deformation of the opening.

These and other objects, features and advantages of the present invention will become more apparent upon a consideration of the following description of the preferred embodiments of the present invention taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a sectional view showing a structure of a cartridge.

FIG. **2** is a sectional view showing a structure of an image forming apparatus.

FIG. **3** is a sectional view at the instant when an unsealing member is unsealed.

FIG. **4** is a sectional view showing a structure of a developer accommodating unit and shows a state in which a sealing portion of a sealing member closes an opening.

FIG. **5** is a sectional view showing a state immediately before unsealing of a first bonding portion started by the advance of rotation of a rotatable member to pull the sealing member.

FIG. **6** is a sectional view showing the structure of the developer accommodating unit and shows a state in which the sealing portion of the sealing member opens the opening.

Parts (a), (b) and (c) of FIG. **7** show a state in which a discharging portion of a flexible container is folded back with respect to a direction (arrow E direction) in which unsealing advances, and are sectional views showing a state of the unsealing of the flexible container.

Parts (a) and (b) of FIG. **8** are sectional views showing the state of the unsealing of the flexible container.

FIG. **9** is a sectional view showing a state in which the unsealing of the flexible container is completed.

FIG. **10** is an illustration showing the discharging portion of the flexible container.

Parts (a) to (d) of FIG. **11** are schematic views for illustrating the opening.

Parts (a), (b) and (c) of FIG. **12** are schematic views, in Comparison example, showing a state in which peeling of a sealing member advances in partway.

Parts (a) and (b) of FIG. **13** are schematic views for illustrating a process of generation of a reinforcing portion.

Parts (a) and (b) of FIG. **14** are schematic views for illustrating another process of generation of the reinforcing portion.

Parts (a) and (b) of FIG. **15** are schematic views including the schematic view, corresponding to (c) of FIG. **11** showing X-X cross-section of the opening in (b) of FIG. **11**, in Embodiment 2.

Parts (a) and (b) of FIG. **16** are schematic views including the schematic view, corresponding to (c) of FIG. **11** showing the X-X cross-section of the opening in (b) of FIG. **11**, in Embodiment 3.

Parts (a) to (d) of FIG. **17** are schematic views, corresponding to those in FIG. **11**, in Embodiment 4.

Parts (a) and (b) of FIG. **18** are perspective views for illustrating a developer accommodating container before unsealing and during the unsealing, respectively, in a reference example.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiment 1

FIG. **2** is a sectional view showing a structure of an image forming apparatus **100** including a flexible container according to Embodiment 1. As shown in FIG. **2**, the image forming apparatus **100** as an electrophotographic image forming apparatus includes an apparatus main assembly B as an image forming apparatus main assembly and is constituted so that a cartridge A as a process cartridge is detachably mountable to the apparatus main assembly B. The cartridge A is prepared by integrally assembling a photosensitive drum **1** and a developer accommodating unit **25**. In a sheet cassette **6** mounted to a lower portion of the apparatus main assembly B, sheets S are accommodated. During image formation, the sheet S is fed toward the photosensitive drum **11**, as an electrophotographic photosensitive drum as an image bearing member, by a feeding roller **7**.

In synchronism with this operation, the surface of the photosensitive drum **11** is electrically charged uniformly by a charging roller **12** and exposed to light by an exposure device **8**, so that an electrostatic latent image is formed on the surface of the photosensitive drum **11**. In the cartridge A, a developer is accommodated and a developing roller **13** as a developer carrying member is provided. The developer is fed to the developing roller **13** by a supplying roller **23** to be carried in a thin layer on the surface of the developing roller **13** by a developing blade **15**. Then, a developing bias is applied to the developing roller **13**, so that the above-described electrostatic latent image is developed with the developer and thus a developer image is formed on the surface of the photosensitive drum **11**.

The developer image is transferred onto the conveyed sheet S by a transfer roller **9** supplied with a bias voltage. Then, the sheet S is conveyed to a fixing device **10** to fix the developer image thereon, and then is discharged onto a discharge portion **3** by a discharging roller pair **1**. Incidentally, the apparatus main assembly B includes a controller **50**, and the controller **50** controls drive of inside devices of the apparatus main assembly B. Further, although described later, the controller **50** controls drive of an urging sheet **21** (FIG. **1**) so that the urging sheet **21** can repetitively urge a flexible container **16** (FIG. **1**) by rotating the urging sheet **21**. Incidentally, an image forming portion **51** for forming an image includes the photosensitive drum **11**, the charging roller **12**, the exposure device **8**, the developing roller **13** and the fixing device **10**, which are described above, and the like.

<Summary of Structure of Process Cartridge>

FIG. **1** is a sectional view showing a structure of the cartridge A. As shown in FIG. **1**, the cartridge A includes a cleaner unit **24** and the developer accommodating unit **25**. The cleaner unit **24** includes the photosensitive drum **11**, a cleaning blade **14** for cleaning the surface of the photosensitive drum **11**, and the charging roller **12** for electrically charging the surface of the photosensitive drum **11**. The developer accommodating unit **25** includes the developing roller **13**, the supplying roller **23** for supplying the developer to the developing roller **13**, and the flexible container **16** for accommodating the developer. The developer accommodating unit **25** will be described specifically below.

The developer accommodating unit **25** includes a frame **17** as a first frame and a frame **18** as a second frame. In an upper region of the frames **17** and **18**, the flexible container **16** and an urging member **500** (urging body or urging means) are disposed. The urging member **500** includes, although described later, the urging sheet **21**, a sealing member **19** and a rotatable member **20**. The present invention is characterized by the flexible container **16**. The flexible container **16** is provided with openings **35***a* for permitting discharge of a developer G (G1), and is a container for accommodating the developer G (G1). In a lower region of the frames **17** and **18**, the developing roller **13** and the supplying roller **23** are disposed. By employing such a constitution, the developer accommodating unit **25** is configured to accommodate the flexible container **16** containing the developer in the upper region of the frames **17** and **18** and to accommodate the developer G (G2) after being discharged from the flexible container **16** in the lower region of the frames **17** and **18**.

The urging member **500** is disposed so as to oppose a lower surface of the flexible container **16**. To the rotatable member **20**, the sealing member **19** and the urging sheet **21** are fixed. The sealing member **19** is a member for urging the flexible container **16** after the sealing member **19** seals the openings **35***a* and then unseals the openings **35***a* by rotation of the rotatable member **20**. Further, the urging sheet **21** urges, during or after an operation in which the sealing member **19** unseals the openings **35***a*, the lower surface of the flexible container **16** to deform the developer flexible container **16**.

Here, the developer accommodating member refers to a container including the flexible container **16** and the sealing member **19** in combination.

<Summary of Structure of Developer Accommodating Unit>

FIG. **4** is a sectional view showing a structure of the developer accommodating unit **25** and shows a state in which a sealing portion **19***a* of the sealing member **19** closes (covers) the openings **35***a*. FIG. **6** is a sectional view showing a structure of the developer accommodating unit **25** and shows a state in which the sealing portion **19***a* of the sealing member **19** opens (unseals) the openings **35***a*.

As shown in FIG. **3**, at a lower portion of the flexible container **16**, fixed portions **16***d* for fixing the flexible container **16** to the frame **18** are formed. At a part of the surface of the flexible container **16**, a discharging portion **35** extending in a longitudinal direction of the flexible container **16** is formed. The discharging portion **35** includes the openings **35***a* for permitting the discharge of the developer and connecting portions **35***b* for connecting (defining) the openings **35***a*.

At an opposing position to the surface of the flexible container **16**, the rotatable member **20** is disposed. The rotatable member **20** is a member rotatable about its shaft (axis) as a rotation center. On the rotatable member **20**, a base end portion of the sealing member **19** is fixed. Specifically, the sealing member **19** includes an engaged portion **19***b*, a connecting portion **19***c* and the sealing portion **19***a*. The engaged portion **19***b* is fixed on the rotatable member **20**, and the sealing portion **19***a* is fixed on the discharging portion **35**. When the rotatable member **20** is rotated in an arrow C direction, the sealing portion **19***a* opens the openings **35***a* (FIG. **6**). The sealing member **19** is fixed on the rotatable member **20** at the engaged portion **19***b* by a retaining member (FIG. **4**) and is fixed on the discharging portion **35** so as to block the openings **35***a* at an end portion thereof.

On the rotatable member **20**, the urging sheet **21** is fixed. When the rotatable member **20** is rotated, the urging sheet **21** urges and urge-releases the flexible container **16** while being rotated. The urging sheet **21** is fixed on the rotatable member **20** at its base end portion by a retaining member. Further, the fixed portions **16***d* of the flexible container **16** are fixed to fixing portions **18***c* of the frame **18**. Thus, the flexible container **16** is supported inside the frames **17** and **18**.

(Structure of Discharging Portion of Flexible Container)

As shown in FIG. **10**, the flexible container **16** includes the discharging portion **35**. The discharging portion **35** includes the openings **35***a* and the connecting portions **35***b*. The openings **35***a* are provided at a plurality of positions of the discharging portion **35** of the flexible container **16** and are configured to permit the discharge of the inside developer. The connecting portions **35***b* connect the plurality of openings **35***a* and define an outer configuration of the flexible container **16**.

Further, the discharging portion **35** is continuously surrounded by the bonding portion **22** to be unsealably bonded, so that the developer accommodated in the developer accommodating member **16** is sealed with the sealing member **19**.

(Structure of Bonding Portion of Flexible Container)

The bonding portion **22** has a rectangular shape consisting of two lines extending in a long direction (arrow F direction) and two lines extending in a short direction (arrow E direction) so as to surround the discharging portion **35** and therefore the bonding portion **22** enables the sealing of the discharge portion **35**.

Here, of the two lines of the welded bonding portion **22** extending in the long direction (arrow F direction), a bonding portion which is first unsealed is referred to as a first bonding portion **22***a* and a bonding portion which is unsealed later is referred to as a second bonding portion **22***b*. In this embodiment, in the case where the bonding portion **22** is viewed along the surface of the sealing member **19**, a bonding portion closer to a fold-back portion **19***d* (FIG. **3**) (or the engaged portion **19***b*) described later is the first bonding portion **22***a*. Further, a bonding portion opposing the first bonding portion **22***a* via the opening **35***a* is the second bonding portion **22***b*. Further, a bonding portion with respect to a widthwise direction (arrow E direction) is a widthwise bonding portion **22***c*.

In this embodiment, an unsealing direction is the arrow E direction. The unsealing direction is defined as follows. In the case where the unsealing is effected by moving the sealing member **19**, of the first bonding portion **22***a* and the second bonding portion **22***b* opposing to each other via the openings **35***a*, the first bonding portion **22***a* is first unsealed (peeled). Thus, a direction directed from the first bonding portion **22***a* to be first unsealed toward the second bonding portion **22***b* is the unsealing direction (arrow E direction).

When the sealing member **19** is unsealed (peeled) from the flexible container **16** in the arrow E direction, in some cases, the peeling microscopically progresses also in the arrow F direction due to the deformation of the flexible container **16** by an unsealing force also in the first bonding portion **22***a* and in the second bonding portion **22***b*. However, the unsealing direction in this embodiment does not refer to such a microscopic unsealing direction.

(Disposition of Openings of Flexible Container)

Next, disposition of the openings **35***a* will be described with reference to FIGS. **10** and **11**. The movement direction (in which the sealing member **19** is pulled by the rotatable member **20**) of the sealing member **19** for sealing the openings **35***a* and for exposing the openings **35***a* by being moved is an arrow D direction. By the movement of the sealing member **19**, the exposure of the openings **35***a* progresses in the unsealing direction (arrow E direction). In the following, the movement direction of the sealing member **19** is the arrow D direction. The plurality of openings **35***a* and the plurality of connecting portions **35***b* are alternately disposed along the arrow F direction (FIG. **10**) perpendicular to the unsealing direction (arrow E direction). Further, the sealing member **19** is configured to be wound up by rotating the rotatable member **20** but the arrow F direction is the same direction as an axis (shaft) of the rotatable member **20**.

(Shape and Direction of Openings of Flexible Container)

Each of the plurality of openings **35***a* in this embodiment has a circular shape. Further, the shape of each opening **35***a* may also be, in addition to the circular shape, a polygonal shape such as a rectangular shape, an elongated circular shape, and the like shape.

Part (a) of FIG. **11** is a partly enlarged plan view of (a) of FIG. **11**. Part (c) of FIG. **11** is a sectional view taken along X-X line indicated in (b) of FIG. **11**. Part (d) of FIG. **11** is a partly enlarged perspective view of the flexible container **16**. As shown in (b) of FIG. **11**, the flexible container **16** which is a "flexible container" as a part of the developer accommodating container **26** for accommodating the developer includes the openings **35***a* for permitting discharge of the developer. The flexible container **16** also includes the connecting portions **35***b* each provided between adjacent two openings **35***a*. The sealing member **19** seals the openings in a state in which the sealing member **19** is bonded to the connecting portions **35***b* located at a periphery of the openings **35***a*, and exposes the openings **35***a* when a pulling force is exerted on the sealing member **19**. A reinforcing portion **35***c***1** is formed in a ring-like shape at the periphery of each of the openings **35***a* to decrease a degree of deformation of the openings **35***a*. Incidentally, the reinforcing portion **35***c***1** may only be required to be provided at least at a part of the periphery of the opening **35***a*. For example, "at least at a part of the periphery of the opening **35***a*", the reinforcing portion **35***c***1** may also be a ring-like portion expanded from the opening **35***a* by a predetermined dimension or may also be not formed at a part of the periphery of the opening **35***a* with respect to a circumferential direction. The reinforcing portion **35***c***1** may only be required to be disposed as a part of the periphery of the opening **35***a* of the flexible container **16**.

The reinforcing portion **35***c***1** is, as shown in (b) of FIG. **11**, provided along an edge of the opening **35***a*, and is, indicated by hatched lines in (c) of FIG. **11**, formed so as to be projected toward an inside and an outside of the flexible container **16**. In this embodiment, the reinforcing portions **35***c***1** are integrally molded with the connecting portions **35***b*.

Parts (a) and (b) of FIG. **13** are schematic views for illustrating a process of generation of the reinforcing portions **31***c***1**. Particularly, (a) of FIG. **13** is the schematic view before processing of the opening **35***a* in X-X cross-section of the opening **35***a* in (b) of FIG. **11**, and (b) of FIG. **13** is the schematic view after the processing (similar to (c) of FIG. **11**). The opening **35***a* is formed as shown in (b) of FIG. **13** by using laser (beam) machining in which the flexible container **16** is irradiated with appropriate laser light (beam) **41** as shown in (a) of FIG. **13** to generate an opening in a shape depending on a locus of the laser light irradiation. The reinforcing portion **35***c***1** is formed at an edge of the opening **35***a* simultaneously with the generation of the opening **35***a* by the laser processing. Further, by heat of the laser light, a portion of the connecting portion **35***b*, i.e., a portion of the surface of the flexible container **16** before the formation of the opening **35***a* is concentrated at the portion of the reinforcing portion **35***c***1**. As a result, a thickness of the reinforcing portion **35***c***1** is larger than a thickness of the connecting portion **35***b*.

Parts (a) and (b) of FIG. **14** are schematic views for illustrating a process, of generation of the reinforcing portion **31***c***1**, different from the process shown in (a) and (b) of FIG. **13**. Particularly, (a) of FIG. **14** is the schematic view during processing of the opening **35***a* in X-X cross-section of the opening **35***a* in (b) of FIG. **11**, and (b) of FIG. **14** is the schematic view after the processing (similar to (c) of FIG.

11). As shown in FIG. **14**, the opening **35***a* is formed by operating a working tool **42** for machining with respect to an arrow direction in (a) of FIG. **14**. At this time, by heating the working tool **42**, an edge of the opening **35***a* of the flexible container **16** is melted. As a result, the reinforcing portion **35***c***1** is formed at the edge of the opening **35***a*.

Further, the direction of the openings **35***a* may preferably be such that the developer accommodated in the developer bag **16** is easily discharged in an attitude during image formation. For that reason, in the attitude during image formation, the openings **35***a* are disposed so as to be open downward with respect to the gravitational direction. The state in which the openings **35***a* open downward with respect to the gravitational direction refers to that the direction of the openings **35***a* has a downward component with respect to the gravitational direction.

(Fixing Between Flexible Container and Frame)

As shown in FIG. **11**, the fixed portion **16***d* of the flexible container **16** receives a force when the sealing member **19** is unsealed (removed) from the flexible container **16** as described later. A plurality of fixed portions **16***d* are provided in parallel to a direction F along which the plurality of openings **35***a* are arranged. Different from the arrangement of the plurality of fixed portions **16***d*, a single fixed portion **16***d* elongated in parallel to the direction F may also be formed. The fixed portions **16***d* are positioned in the neighborhood of the openings **35***a* of the flexible container **16**.

The fixing portions **16***d* are fixing portions necessary for the time of unsealing the flexible container **16**, and its action and arrangement will be described later in the description of the unsealing.

<Structure of Sealing Member>

As shown in FIG. **4**, the sealing member **19** covers the discharging portion **35** of the flexible container **16** before use of the cartridge A to confine the developer in the flexible container **16**. The sealing member **19** is moved, so that the openings **35***a* are exposed. The sealing member **19** is constituted by a sheet-like sealing member including a sealing portion **19***a* for covering (sealing) the discharging portion **35** of the flexible container **16**, an engaged portion **19***b* to be fixed (engaged) with the rotatable member **20** described later, and a connecting portion **19***c* which connects the sealing portion **19***a* and the engaged portion **19***b*. The sheet-like sealing member is formed of a laminate material having a sealant layer which exhibits an easy-unsealing property described later, and a base material therefor is polyethylene telephthalate (PET), polyethylene, polypropylene or the like. A thickness of the sheet-like sealing member may appropriately be set in a range of 0.03-0.15 mm.

(Sealing Portion of Sealing Member)

A sealing portion **19***a* refers to a region where the sealing member **19** covers the plurality of openings **35***a* and connecting portions **35***b* of the flexible container **16** to seal the openings **35***a*. By the sealing portion **19***a*, the developer is prevented from being leaked from the inside of the flexible container **16** until before use of the cartridge A.

(Engaging portion of sealing member)

The sealing member **19** has a free end portion in one end side thereof with respect to the unsealing direction E, and at the free end portion, the engaged portion **19***b* to be engaged with the rotatable member **20** for moving the sealing member **19** is provided. With the engaged portion **19***b*, the rotatable member **20** for moving the sealing member to expose the openings **35***a* is engaged. The rotatable member **20** may also be configured to be automatically subjected to the unsealing (pealing) by receiving a driving force from the image forming apparatus main assembly B. Or, the rotatable member **20** may also be configured to be subjected to the unsealing (peeling) by being held and moved by the user. In this embodiment, the rotatable member **20** is a rotation shaft provided in the frame, and the sealing member **19** engaged with the rotatable member **20** is pulled, so that the flexible container **16** accommodating the developer is unsealed.

(Connecting Portion of Sealing Member)

A plurality of connecting the bonding portion **22** and the engaged portion **19***b* is the connecting portion **19***c*. The connecting portion **19***c* is a portion for transmitting a force so as to pull off the bonding portions **22** by receiving the force from the rotatable member **20**.

(Folding-Back of Connecting Portion)

Referring to FIG. **3**, a plane formed between the first bonding portion **22***a* and the second bonding portion **22***b* at the moment of the unsealing is taken as N1. A plane which is perpendicular to the plane N1 and which passes through the first bonding portion **22***a* is taken as N2.

The rotatable member **20** is disposed closer to the second bonding portion **22***b* than the plane N2 passing through the first bonding portion **22***a*. In other words, the sealing member **19** includes when it is seen along the surface of the sheet-like sealing member **19**, a fold-back portion **19***d* where the sealing member **19** is folded back at the portion (connecting portion **19***c*) between the connecting portion **22** and the engaged portion **19***b* engaged with the rotatable member **20**. The fold-back portion **19***d* may be provided with or not provided with a fold (crease). A folding angle Q of the sealing member **19** may preferably be 90 degrees or less. The folding angle Q is an angle Q between a plane of the bonding portion **22** of the flexible container **16** and a plane along the arrow D direction in which the sealing member **19** is pulled.

(Fixing of Sealing Member)

Further, fixing between the sealing member **19** and the rotatable member **20** is, in this embodiment, made by the ultrasonic clamping similarly as in the case of the fixed portion **16***d*. Other than the ultrasonic clamping, the fixing may also be made by the (heat) welding, the ultrasonic welding, the bonding, the insertion between the frames, the hooking by a hole and a projection, or the like similarly as the means for fixing the fixed portion **16***d*.

(Portion Having Easy-Unsealing Property of Sealing Member)

A method of providing a peeling force of the bonding portion **22** with a desired value will be described. In this embodiment, in order to provide the peeling force with the desired value (a minimum force within a range in which the toner sealing property can be maintained), two methods are principally employed.

In a first method, a laminate material having a sealant layer for enabling easy unsealing of the sealing member is applied. Further, the first method is a method in which the easy unsealing is enabled at the bonding portion by using, as the material for the flexible container **16**, a sheet material (of, e.g., polyethylene or polypropylene) which is weldable with the sealant layer and which has flexibility. By changing a combination of formulation of the sealant layer with the material to be bonded, the peeling force can be adjusted correspondingly to a desired condition. In this embodiment, a material having a peeling strength of about 3N/15 mm measured by testing methods for heat sealed flexible packages (JIS-Z0238) is used.

A second method is a method in which as shown in FIGS. **3**, **4** and **7**, the discharging portion **35** of the flexible container **16** is placed in a state in which the sealing member **19** is folded back with respect to an unsealing direction (arrow E direction). For example, in the state of FIG. **4**, the rotatable

member **20** is rotated in the rotational direction (arrow C direction), so that the sealing member **19** is pulled in a pulling direction (arrow D direction) by the rotatable member **20**. As a result, the flexible container **16** and the sealing member **19** provide an inclined peeling positional relationship, as shown in FIG. **3**, in which the angle Q between the plane of the bonding portion **22** of the flexible container **16** and the plane along the pulling direction (arrow D direction) of the sealing member **19** is 90 degrees or more. It has been conventionally known that the peeling force necessary to separate the both surfaces can be reduced by establishing the inclined peeling positional relationship. Therefore, as described above, the discharging portion **35** is placed in the state in which the sealing member **19** is folded back with respect to the unsealing direction (arrow E direction), so that the sealing member **19** of the bonding portion **22** and the flexible container **16** are placed in the inclined peeling positional relationship and thus the peeling force can be adjusted so as to be reduced.

<Structure of Rotatable Member>

The rotatable member **20** is used for the purpose of peeling the sealing member **19** from the flexible container **16** by applying a force to the sealing member **19** to move the sealing member **19**. The rotatable member **20** includes a supporting portion (not shown) which has a shaft shape and which is rotatably supported by the second frame **18** at its ends, and includes an engaging portion **20***b* to which the engaged portion **19***b* of the sealing member **19**. In this embodiment, the rotatable member **20** has a rectangular shaft shape, and the engaged portion **19***b* of the sealing member **19** is engaged with the engaging portion **20***b* at one of four sides of the rectangular shaft.

<Summary of Unsealing of Flexible Container>

The unsealing of the flexible container **16** will be described with reference to FIGS. **4** to **8**.

For unsealing the flexible container **16**, the developer accommodating unit **25** includes a power application point portion **20***a* where the rotatable member **20** applies the force for pulling the sealing member **19**, and includes the fixing portion **18***a* of the frame for fixing the flexible container **16** to be pulled.

The power application point portion **20***a* is a portion, closest to the bonding portion **22**, of a portion where the sealing member **19** and the rotatable member **20** contact at the moment of the unsealing. In (b) of FIG. **7**, a corner portion **20***c* of the rotatable member **20** constitutes the power application point portion **20***a*. The fixing portion **18***a* of the frame **18** includes a fixing portion **18***c* for suppressing movement of the flexible container **16** caused by the force during the unsealing. In this embodiment, the first fixing portion **18***a* of the frame **18** and the fixed portion **16***d* of the flexible container **16** are bonded to each other by the ultrasonic clamping. As shown in (b) and (c) of FIG. **7** and (a) of FIG. **8**, a portion, closer to the bonding portion **22**, of the first fixing portion **18***a* bonded by the ultrasonic clamping constitutes the fixing portion **18***c*.

As shown in FIG. **4**, the rotatable member **20** is rotated in the arrow C direction by transmission of the driving force thereto by an unshown driving means provided to the apparatus main assembly B.

A state immediately before the sealing member **19** is pulled by further rotation of the rotatable member **20** to start the unsealing is shown in FIG. **5** and (c) of FIG. **7**. With the rotation, the sealing member **19** fixed to the rotatable member **20** by the engaged portion **19***b* is pulled in the arrow D direction by the corner portion **20***c* (power application point portion **20***a*) of the rectangular rotatable member **20**.

When the sealing member **19** is pulled, the flexible container **16** is pulled via the bonding portion **22**. Then, a force is applied to the fixed portion **16***d* of the flexible container **16**, so that the flexible container **16** is pulled from the fixing portion **18***c* toward the power application point portion **20***b* by the fixing portion **18***c*. Then, in a cross section perpendicular to the rotation shaft of the rotatable member **20**, the first bonding portion **22***a* is moved to approach a line connecting the power application point portion **20***a* and the fixing portion **18***c*. At this time, with respect to the arrow D direction, from a side close to the rotation shaft of the rotatable member **20**, the portions are disposed in the order of the openings **35***a*, the first bonding portion **22***a*, the fold-back portion **19***d* and the fixing portion **18***c* ((b) of FIG. **7**). Further, the unsealing member **19** is folded back between the first bonding portion **22***a* and the engaged portion **19***b* and therefore the force is applied to the portion of the first bonding portion **22***a* so as to be inclination-peeled in the arrow D direction. Then, the peeling of the first bonding portion **22***a* is effected to start the unsealing of the discharging portion **35**.

Together with the corner portion **20***c*, also the power application point portion **20***a* is moved in the arrow C direction, and when the sealing member contacts a corner portion **20***d*, the power application point portion **20***a* is moved from the corner portion **20***c* to the corner portion **20***d*. Part (b) of FIG. **7** shows a state in which the power application point portion **20***a* is the corner portion **20***c*, and (c) of FIG. **7** shows a state in which the rotatable member **20** in further rotated and thus the power application point portion **20***a* is moved to the corner portion **20***d*.

As shown in FIG. **6** and (c) of FIG. **7**, when the unsealing is advanced with further rotation of the rotatable member **20**, also the fold-back portion **19***d* is moved in the arrow E direction. Then, the unsealing is further advanced, so that the openings **35***a* are exposed. A state in which the peeling of the second bonding portion **22***b* is to be started after the openings **35***a* are exposed is shown in (a) of FIG. **8**. Also at this time, similarly as in the case of the peeling of the first bonding portion **22***a*, the sealing member **19** is pulled toward the power application point portion **20***a*, and the flexible container **16** stands firm toward a direction of the fixing portion **18***c* (an arrow H direction). Then, in a cross section perpendicular to the rotation shaft of the rotatable member **20**, the second bonding portion **20***b* is moved to approach a line connecting the power application point portion **20***a* and the fixing portion **18***c*. Then, the force is applied to the portion of the bonding portion **22***b* in the arrow D direction, so that the second bonding portion **22***b* is separated. Thus, the second bonding portion **222***b* is peeled to complete the unsealing ((b) of FIG. **8** and FIG. **9**). Then, the developer inside the flexible container **16** is discharged in an arrow I direction through the openings **35***a* of the discharging portion **35**.

Thus, the sealing member **19** is wound up around the rotatable member **20** by the rotation of the rotatable member **20**, so that the bonding portion **22** is unsealed. The sealing member **19** is wound up by the rotation of the rotatable member **20**, and therefore a space required to move the rotatable member **20** may only be required to be a rotation space of the rotatable member **20**, and compared with the case where the sealing member **19** is moved by movement other than the rotation, it is possible to realize space saving.

By providing the sealing member **19** with the fold-back portion **19***d*, so that the bonding portion **22** can be inclination-peeled without using shearing peeling and thus can be unsealed with reliability.

Further, the engaged portion **19***b*, to be engaged with the rotatable member **20**, for unsealing the sealing member **19** in an end side of the sealing member **19** with respect to a direction substantially perpendicular to the arrow F direction in

which the plurality of openings **35***a* are arranged is provided, so that the sealing member **19** can be engaged and unsealed with reliability.

Further, by providing the frame with the fixing portion **18***c*, the flexible container **16** is supported by the frame during the unsealing, so that even a soft and deformable flexible container **16** becomes unsealable with reliability.

With respect to the discharge of the developer during the unsealing, as described above, the bonding portion **22** is moved along the line connecting the power application point portion **20***a* and the fixing portion **18***c* (in the order of (a) of FIG. **7**, (b) of FIG. **7**, (c) of FIG. **7** and (a) of FIG. **8**). By this motion, the developer at the periphery of the openings **35***a* is moved, so that agglomeration of the developer can be broken.

(Positional Relation of Fixing Portion Associated with Unsealing)

As shown in FIG. **4**, in order to peel off the first bonding portion **22***b* with reliability, the following positional relation is required between the first bonding portion **22***b* and the fixing portion **18***c*. During the unsealing, with respect to the fixing portion **18***c*, the rotatable member **20** pulls the sealing member **19** in the arrow D direction. At this time, with respect to the movement direction (arrow D direction) of the sealing member **19** by the rotatable member **20**, the fixing portion **18***c* is provided upstream of the openings **35***a*. For that reason, a force is applied to the fixing portion **18***c* in the arrow H direction. Therefore, when the unsealing force is applied, the sealing member **19** is pulled in the arrow H direction and the arrow D direction between the fixing portion **18***c* and the rotatable member **20** to apply a force to the first bonding portion **20***a*, thus advancing the unsealing. Thus, when the fixing portion **18***c* is not provided upstream with respect to the movement direction (arrow D direction) of the sealing member **19**, the entire flexible container **16** is pulled in the direction in which the sealing member **19** is pulled, so that the force cannot be applied to the first bonding portion **22***a* and thus the first bonding portion **22***a* cannot be unsealed.

In this way, the fixing portion **18***c* is provided upstream with respect to the movement direction (arrow D direction) of the sealing member **19**, so that reliable unsealing becomes possible.

(Positional Relation of Second Bonding Portion)

With reference to FIG. **3** showing a state immediately before the first bonding portion **22***a* is unsealed, an arrangement in which the second bonding portion **22***b* can be more satisfactorily unsealed without being wound up around the rotatable member **20** will be described. First, an end portion of the first bonding portion **22***a* remote from the openings **35***a* is taken as a second point **22***e*. An end portion of the second bonding portion **22***b* remote from the openings **35***a* is taken as a third point **22***f*. A distance from the second point **22***e* to the third point **22***f* is taken as L1. A distance from the second point **22***e* to the power application point portion **20***a* is taken as L2. In this case, the distances L1 and L2 are required to satisfy the relationship of L1<L2.

This is because in the case where L1 is larger than L2, the second bonding portion **22***b* reaches the power application point portion **22***a* before the peeling of the second bonding portion **22***b* is ended, and thus the second bonding portion **22***b* is wound about the rotatable member **20**. Therefore, the force cannot be applied so as to peel off the sealing member **19** from the second bonding portion **22***b*. For that reason, it becomes difficult to unseal the sealing member **19** from the flexible container **16**.

As described above, the relationship between the distance L1 and L2 is made to satisfy: L1<L2, so that the sealing member **19** is satisfactorily unsealable without being wound about the rotatable member **20**.

(Function of Connecting Portions Defining Openings)

A summary of the connecting portions **35***b*, defining the openings **35***a*, which perform a large function in the unsealing operation of the flexible container **16** will be described.

Part (a) of FIG. **11** is a schematic view of the discharging portion **35** when the peeling at the first bonding portion **22***a* to be first unsealed is ended to expose the openings **35***a*, and shows a state in which the peeling at the second bonding portion **22***b* is not ended. As described above, the discharging portion **35** includes the plurality of openings **35***a* shifted and disposed along the direction F perpendicular to the unsealing direction E in which the exposure of the openings **35***a* is advanced. For that reason, also the plurality of connecting portions **35***b* defining the plurality of openings **35***a* are disposed along the arrow F direction. As a result, the plurality of connecting portions **35***b* connect the first bonding portion **22***a* and the second bonding portion **22***b* with respect to the unsealing direction (arrow E direction) of the openings **35***a*. For that reason, at the time of the state of (a) of FIG. **8** in which the unsealing of the first bonding portion **22***a* is ended, the force for unsealing the second bonding portion **22***b* can be received by the fixed portion **16***d* via the connecting portions **35***b*, so that the force for peeling off the sealing member **19** from the flexible container **16** can be transferred. That is, the forces are applied to the second bonding portion **22***b* in the arrow D direction and the arrow E direction, so that also at the second bonding portion **22***b*, the sealing member **19** is peelable.

Thus, by the presence of the connecting portions **35***b* for connecting the first and second bonding portions **22***a* and **22***b* at the discharging portion **35**, the developer accommodating container **30** including the developer accommodating container **26** accommodating the developer and including the rotatable member **20** can transmit the unsealing force of the rotatable member **20** until the second bonding portion **22***b* is unsealed, so that the discharging portion **35** can be unsealed with reliability.

(Effect of Thick Portion)

An effect of the reinforcing portion **35***c***1** will be described. First, as Comparison example, an abnormal phenomenon which occurs infrequently will be described. Thereafter, a constitution and an effect in this embodiment of the present invention will be described.

First, the abnormal phenomenon which occurs infrequently will be described. A state of unsealing of the flexible container **16** in partway in the case where the abnormal phenomenon occurs is shown in FIG. **12**. Part (a) of FIG. **12** is a schematic view showing a state in which peeling of the second bonding portion **22***b* advances in partway, and a peeling direction is the same as that shown in FIG. **11**.

Depending on a variation of a member for the flexible container **16**, in the case where a thickness of the flexible container **16** in the neighborhood of the second bonding portion **22***b* and the openings **35***b* is thin or in the like case, rigidity against pulling at the periphery of the openings **35***a* is low. For that reason, during the peeling of the second bonding portion **22***b*, such a phenomenon that the flexible container **16** cannot withstand a peeling force for peeling the second bonding portion **22***b* and thus the openings **35***a* are deformed excessively to be elongated occurs in frequently. Part (a) of FIG. **12** shows the case where at an opening **35***a***1** as a part of the openings **35***a*, this phenomenon occurs and thus an elongated opening portion **35***a***2** is generated. A detailed schematic view of the opening **35***a***1** is shown in (b) of FIG. **12**. A

cross sectional view taken along a chain line indicated by arrows is shown in (c) of FIG. **12**.

When the elongated opening portion **35***a***2** is generated in partway of the peeling of the second bonding portion **22***b*, as shown in (b) and (c) of FIG. **12**, forces acting locally at the periphery of the second bonding portion **22***b* are directed in an arrow X direction and an arrow Y direction. In this case, the peeling is performed by generally known shearing peeling (approximately 0-degree peeling), and therefore a large force is required. As a result, a force necessary to peel the whole second bonding portion **22***b* becomes large or it is impossible to perform the peeling. That is, the case where the unsealing is stopped occurs infrequency.

As described above, in the case where the elongated opening portion **35***a***2** is generated at the opening **35***a***1** as the part of the openings **35***a*, different from a normal case, the abnormal phenomenon such that the peeling requires the large force occurs. Here, an important point is that the abnormal phenomenon occurs in the case where the openings **35***a* are excessively deformed.

In this embodiment, as shown in FIG. **11**, the reinforcing portion **35***c***1** is provided at the edge of the opening **35***a*. As a result, it is possible to decrease a degree of the excessive deformation of the openings during the peeling of the bonding portion. That is, it is possible to suppress an increase in force necessary to perform the peeling by decreasing a degree of the elongation of the openings **35***a*. Accordingly, it is possible to suppress the occurrence of the abnormal phenomenon that the necessary peeling force is increased.

Embodiment 2

A constitution of a flexible container **16** in Embodiment 2 will be described with reference to (a) of FIG. **15**. Part (a) of FIG. **15** is a schematic view corresponding to (c) of FIG. **11** showing the X-X cross section of the opening **35***a* in (b) of FIG. **11**. As shown in (a) of FIG. **15**, in this embodiment, a reinforcing portion **35***c***2** is provided along an edge of an opening **35***a* so as to be projected toward an inside of the flexible container **16**. When a constitution in which the reinforcing portion **35***c***2** in this embodiment is projected toward the inside of the flexible container **16** is employed, the constitution is advantageous in that the reinforcing portion **35***c***2** can be easily formed by inserting a working tool **44** ((b) of FIG. **15**) from an outside of the flexible container **16**. Incidentally, on the other hand, in the case of a constitution in which the reinforcing portion **35***c***2** is projected to the outside of the flexible container **16**, it can be said that this constitution is somewhat disadvantageous. Further, the reinforcing portion **35***c***2** is formed integrally with the flexible container **16** and is bent with respect to the connecting portion **35***b* at the periphery of the reinforcing portion **35***c***2**.

Next, a method of formation of the reinforcing portion **35***c***2** will be specifically described with reference to (c) of FIG. **15**. Part (b) of FIG. **15** is a schematic view showing during the processing of the formation of the reinforcing portion **35***c***2** shown in (a) of FIG. **15**. As shown in (b) of FIG. **15**, the working tool **44** for machining is operated with respect to an arrow direction in the figure, whereby the opening **35***a* is formed. At the same time of the generation of the opening **35***a*, the reinforcing portion **35***c***2** is generated at the edge of the opening **35***a*. A specific shape of the reinforcing portion **35***c***2** is similar to a shape obtained by burring (processing) frequently used in sheet metal processing.

Also in the constitution in this embodiment, similarly as in Embodiment 1, it is possible to decrease a degree of the excessive deformation of the openings during the peeling of the bonding portion. That is, it is possible to suppress an increase in force necessary to perform the peeling by decreasing a degree of the elongation of the openings **35***a*. Accordingly, it is possible to suppress the occurrence of the abnormal phenomenon that the necessary peeling force is increased.

Embodiment 3

A constitution of a flexible container **16** in Embodiment 3 will be described with reference to (a) of FIG. **16**. Part (a) of FIG. **16** is a schematic view corresponding to (c) of FIG. **11** showing the X-X cross section of the opening **35***a* in (b) of FIG. **11**. As shown in (a) of FIG. **16**, in this embodiment, a reinforcing portion **35***c***3** is provided along an edge of an opening **35***a* so as to be projected toward an outside of the flexible container **16**. When a constitution in which the reinforcing portion **35***c***3** in this embodiment is projected toward the outside of the flexible container **16** is employed, the constitution is advantageous in that the developer does not readily remain in the flexible container **16**. Incidentally, on the other hand, in the case of a constitution in which the reinforcing portion **35***c***3** is projected to the inside of the flexible container **16**, it can be said that the developer is liable to somewhat remain inside the flexible container **16**. Further, the reinforcing portion **35***c***3** is formed integrally with the developer accommodating container **26** and is bent with respect to the flexible container **16** at the periphery of the reinforcing portion **35***c***3**.

Next, a method of formation of the reinforcing portion **35***c***2** will be specifically described with reference to (c) of FIG. **16**. Part (b) of FIG. **16** is a schematic view showing during the processing of the formation of the reinforcing portion **35***c***2** shown in (a) of FIG. **16**. As shown in (b) of FIG. **16**, the working tool **44** for machining is operated with respect to an arrow direction in the figure, whereby the opening **35***a* is formed. At the same time of the generation of the opening **35***a*, the reinforcing portion **35***c***3** is generated at the edge of the opening **35***a*. A specific shape of the reinforcing portion **35***c***3** is similar to a shape obtained by burring (processing) frequently used in sheet metal processing.

Also in the constitution in this embodiment, similarly as in Embodiment 1, it is possible to decrease a degree of the excessive deformation of the openings during the peeling of the bonding portion. That is, it is possible to suppress an increase in force necessary to perform the peeling by decreasing a degree of the elongation of the openings **35***a*. Accordingly, it is possible to suppress the occurrence of the abnormal phenomenon that the necessary peeling force is increased.

Embodiment 4

A constitution of a flexible container **16** in Embodiment 4 will be described with reference to FIG. **17**. In the constitution in this embodiment, a reinforcing portion **35***d* has the same function as the reinforcing portion **35***c* in each of Embodiments 1, 2 and 3. FIG. **17** includes schematic views corresponding to those in FIG. **11**. A detailed view of a portion of the openings **35***a* and the connecting portions **35***b* in (a) of FIG. **17** is shown in (b) of FIG. **17**. Further, the X-X cross section of the opening **35***a* in (b) of FIG. **17** is shown in (d) of FIG. **17**. As shown in (b) and (d) of FIG. **17**, the reinforcing portion **35***d* is provided at the periphery of the opening **35***a*. Elastic modulus of the reinforcing portion **35***d* is higher than elastic modulus of a portion, of the flexible container **16**, where the reinforcing portion **35***d* is not provided.

Further, in this embodiment, as a material for the flexible container **16**, a material of which elastic modulus is higher

after laser irradiation than before the laser irradiation is used. Specifically, e.g., as the material for the flexible container **16**, a flexible material containing an ultraviolet (UV) curable agent is used. However, it can also be said that only the reinforcing portion **35***d* may only be required to contain the UV curable agent.

Next, a method of formation of the reinforcing portion **35***d* will be described. Part (c) of FIG. **17** is a schematic view showing a state during formation of the reinforcing portion **35***d* shown in (b) of FIG. **17**, and (d) of FIG. **17** is a schematic view (similar to that of (d) of FIG. **17**) showing a state after the formation of the reinforcing portion **35***d*. A periphery of the opening **35***a* formed by machining (in which the state of during machining is not illustrated) is irradiated with UV laser light **43**, whereby the elastic modulus of the material for the flexible container **16** itself is changed to generate the reinforcing portion **35***d*.

Also in the constitution in this embodiment, it is possible to decrease a degree of the excessive deformation of the openings during the peeling of the bonding portion. That is, it is possible to suppress an increase in force necessary to perform the peeling by decreasing a degree of the elongation of the openings **35***a*. Accordingly, it is possible to suppress the occurrence of the abnormal phenomenon that the necessary peeling force is increased.

According to the constitution in each of Embodiments 1 to 4, when the sealing member **19** is peeled from the flexible container **16** at the periphery of the openings **35***a*, deformation of the openings **35***a* is suppressed, so that a load necessary for the peeling is suppressed.

Incidentally, in the constitutions in Embodiments 1 to 4, a dimension X1 which is the sum of the thickness of the flexible container **16** and the thickness of the reinforcing portion **35***c* (**35***d*) is set at a value which is two times or more and five times or less of a dimension X0 of the thickness of the flexible container **16**. For example, X0 is set at 100 μm, and X1 is set at 100 μm to 500 μm.

In the constitutions in Embodiments 1 to 4, the reinforcing portion **35***c* (**35***d*) is integrally molded with the connecting portion **35***b* at the periphery of the opening **35***a*, but these constitutions are not limitative. That is, the reinforcing portion **35***c* (**35***d*) may also be a separate member applied onto the connecting portion **35***b* at the periphery of the opening **35***a*. In this case, the reinforcing portion **35***c* (**35***d*) may be molded with the same material as or with a different material from the material for the flexible container **16**. Further, the constitutions in Embodiments 1 to 4 can be used in combination. For example, the UV curable agent may also be contained in the reinforcing portions in Embodiments 1 to 3 and then may be cured by UV irradiation.

REFERENCE EXAMPLE

For the purpose of improving an unsealing characteristic of the sealing member for sealing the openings of the deformable developer accommodating container, it would be considered that a flexible container **16** as shown in FIG. **18** is used. Part (a) of FIG. **18** is a perspective view showing the flexible container **16** before unsealing, and (b) of FIG. **18** is a perspective view of the flexible container **16** during the unsealing. In FIG. **18**, a plurality of openings **35***a* for permitting discharge of the developer are arranged along a longitudinal direction of the flexible container **16**. Further, before the unsealing of the openings **35***a*, the sealing member **19** is mounted to the flexible container **16** in a state in which the sealing member **19** seals the plurality of openings **35***a*, and when the openings **35***a* are unsealed, is pulled, so that the openings **35***a* are exposed. These openings are shifted and arranged in a direction perpendicular to the unsealing direction in which the exposure of the openings **35***a* advances. By employing such a constitution, a degree of large deformation of the openings **35***a* is decreased, so that the unsealing characteristic of the sealing member **19** for sealing the openings **35***a* of the flexible container **16**.

However, in the above-described constitution, the following phenomenon occurs infrequently. That is, in the case where the thickness of the flexible container **16** is thin in the neighborhood of the openings **35** and the bonding portion between the openings **35***a* and the sealing member **19**, resulting from the occurrence of thickness variation of the flexible container **16**, rigidity against pulling at the periphery of the openings **35***a* is low, and therefore in a process in which the sealing member **19** is peeled from the openings **35***a*, a part of the openings **35***a* is excessively deformed. For that reason, a phenomenon such that a force for peeling the sealing member **19** from the openings **35***a* becomes large can occur. In this phenomenon, a part of the openings **35***a* is elongated and excessively deformed due to the low rigidity against the pulling at the periphery of the openings **35***a*, and thus the necessary peeling force is increased. Even in consideration of this phenomenon, it is understood that usefulness of the constitutions described in the embodiments according to the present invention is high.

According to the present invention, when the sealing member is peeled from the flexible container at the periphery of the openings, a degree of the deformation of the openings is decreased, so that the load necessary for the peeling is reduced.

While the invention has been described with reference to the structures disclosed herein, it is not confined to the details set forth and this application is intended to cover such modifications or changes as may come within the purpose of the improvements or the scope of the following claims.

This application claims priority from Japanese Patent Applications Nos. 003947/2013 filed Jan. 11, 2013 and 112297/2013 filed May 28, 2013, which are hereby incorporated by reference.

What is claimed is:

1. A developer accommodating container for accommodating developer, said developer accommodating container comprising:

a flexible container provided with a surface having an opening therein for permitting discharge of the developer;

a sealing member for sealing the opening in a state in which said sealing member is bonded to a periphery of the opening in said surface, wherein said sealing member is capable of exposing the opening by being removed in an unsealing direction; and

a reinforcing portion provided at the periphery of the opening and on said surface,

wherein a thickness of said flexible container and said reinforcing portion is thicker than that of a thickness of said flexible container in a direction perpendicular to said surface, and

wherein said reinforcing portion is formed of the same material as a material for said flexible container.

2. A developer accommodating container according to claim **1**, wherein said reinforcing portion is provided along an edge of the opening so as to be projected toward an inside of said flexible container and perpendicular to said surface.

3. A developer accommodating container according to claim **1**, wherein said reinforcing portion is provided along an

edge of the opening so as to be projected toward an outside of said flexible container and perpendicular to said surface.

4. A developer accommodating container according to claim **1**, wherein a dimension obtained by adding a thickness of said flexible container and a thickness of said reinforcing portion is set to a value that is two times or more and five times or less of a dimension of the thickness of said flexible container.

5. A developer accommodating container according to claim **1**, wherein said reinforcing portion is a separate member bonded to said flexible container at the periphery of the opening.

6. A developer accommodating container according to claim **1**, wherein said reinforcing portion has an elastic modulus greater than an elastic modulus of said flexible container at a position where said reinforcing portion is not provided.

7. A developer accommodating container according to claim **1**, wherein said reinforcing portion is formed integrally with said flexible container and is bent with respect to said flexible container at a periphery thereof.

8. A developer accommodating container according to claim **1**, wherein said reinforcing portion contains an ultraviolet-curable material.

9. A process cartridge comprising:

an electrophotographic photosensitive drum; and

a developer accommodating container according to claim **1**.

10. An image forming apparatus comprising:

an image forming portion for forming an image; and

a developer accommodating container according to claim **1**.

11. A developing device comprising:

a developing carrying member carrying developer; and

a developer accommodating container according to claim **1**.

12. A developer accommodating container according to claim **1**, wherein said reinforcing portion is next to the opening.

13. A developer accommodating container according to claim **1**, further comprising a bonding portion between said sealing member and said flexible container, said bonding portion being located downstream of the opening with respect to the unsealing direction.

14. A developer accommodating container according to claim **1**, wherein said reinforcing portion is surrounded by a bonding portion between said sealing member and said flexible container.

15. A developer accommodating container according to claim **1**, wherein said flexible container is provided with a surface having a plurality of openings.

16. A developer accommodating container for accommodating developer, said developer accommodating container comprising:

a flexible container provided with a surface having an opening therein for permitting discharge of the developer;

a sealing member for sealing the opening in a state in which said sealing member is bonded to a periphery of the opening in said surface, wherein said sealing member is capable of exposing the opening by being removed in an unsealing direction; and

a reinforcing portion provided at the periphery of the opening and on said surface,

wherein a thickness of said flexible container and said reinforcing portion is thicker than that of a thickness of said flexible container in a direction perpendicular to said surface, and

wherein said reinforcing portion is provided along an edge of the opening so as to be projected toward an inside of said flexible container and perpendicular to said surface.

17. A developer accommodating container for accommodating developer, said developer accommodating container comprising:

a flexible container provided with a surface having an opening therein for permitting discharge of the developer;

a sealing member for sealing the opening in a state in which said sealing member is bonded to a periphery of the opening in said surface, wherein said sealing member is capable of exposing the opening by being removed in an unsealing direction; and

a reinforcing portion provided at the periphery of the opening and on said surface,

wherein a thickness of said flexible container and said reinforcing portion is thicker than that of a thickness of said flexible container in a direction perpendicular to said surface, and

wherein a dimension obtained by adding a thickness of said flexible container and a thickness of said reinforcing portion is set to a value that is two times or more and five times or less of a dimension of the thickness of said flexible container.

18. A developer accommodating container according to claim **17**, wherein said reinforcing portion is provided along an edge of the opening so as to be projected toward an inside of said flexible container and perpendicular to said surface.

19. A developer accommodating container according to claim **17**, wherein said reinforcing portion is provided along an edge of the opening so as to be projected toward an outside of said flexible container and perpendicular to said surface.

20. A developer accommodating container according to claim **17**, wherein said reinforcing portion is a separate member bonded to said flexible container at a periphery of the opening.

21. A developer accommodating container according to claim **17**, wherein said reinforcing portion has an elastic modulus greater than an elastic modulus of said flexible container at a position where said reinforcing portion is not provided.

22. A developer accommodating container according to claim **17**, wherein said reinforcing portion is formed integrally with said flexible container and is bent with respect to said flexible container at a periphery thereof.

23. A developer accommodating container according to claim **17**, wherein said reinforcing portion contains an ultraviolet-curable material.

24. A process cartridge comprising:

an electrophotographic photosensitive drum; and

a developer accommodating container according to claim **17**.

25. An image forming apparatus comprising:

an image forming portion for forming an image; and

a developer accommodating container according to claim **17**.

26. A developing device comprising:

a developing carrying member carrying developer; and

a developer accommodating container according to claim **17**.

27. A developer accommodating container according to claim **17**, wherein said reinforcing portion is surrounded by a bonding portion between said sealing member and said flexible container.

28. A developer accommodating container for accommodating developer, said developer accommodating container comprising:

a flexible container provided with a surface having an opening therein for permitting discharge of the developer;

a sealing member for sealing the opening in a state in which said sealing member is bonded to a periphery of the opening in said surface, wherein said sealing member is capable of exposing the opening by being removed in an unsealing direction; and

a reinforcing portion provided at the periphery of the opening and on said surface,

wherein a thickness of said flexible container and said reinforcing portion is thicker than that of a thickness of said flexible container in a direction perpendicular to said surface, and

wherein said reinforcing portion is formed integrally with said flexible container and is bent with respect to said flexible container at a periphery thereof.

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